Railway Age Gazette

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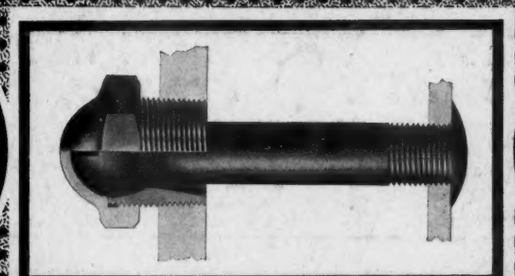

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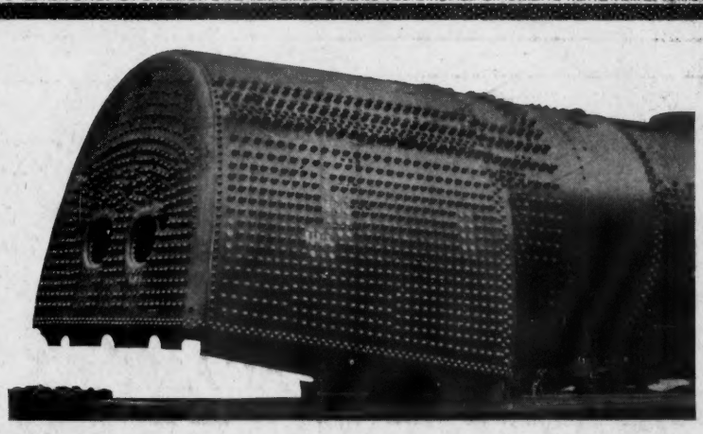

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Railway Age Gazette

Volume 60. April 28, 1916 No. 17

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Railway men probably are in some doubt as to whether they should rejoice or be sorrowful because the Hon. Clifford Thorne, chairman of the Railroad Commission of Iowa, is going to run for Congress. In one respect his retirement from the field of railway regulation will, from a railway standpoint, be highly regrettable. In recent years the railways have been receiving constantly improving treatment from regulating bodies, especially the Interstate Commerce Commission; and we believe this has been chiefly due to Mr. Thorne. As there are some people whose virtue is of such a nature as to make virtue itself odious, so there are some whose support is a liability and whose opposition is an asset. Mr. Thorne belongs to both these classes; and it may be more difficult for the railways to win their cases before Interstate Commerce Commission and the Courts now that he is no longer to appear regularly against them. But his transfer to Congress will have compensating advantages. There is vital need for constructive legislation for the reform of our entire system of railway regulation, state as well as national. Mr. Thorne, if elected to Congress, may be absolutely relied upon to oppose all such legislation in his own peculiarly winning and reasonable manner. This will make its passage tolerably easy and certain; and therefore he may prove even more useful to the railways as a member of Congress than he has been as a member of the Iowa Railroad Commission. However, just as long as age does not wither or custom stale Mr. Thorne's infinite variety of ways of making attacks on the railways unpopular he will be useful to them in any walk of public life which he may enter.

Mr. Thorne Will Run For Congress

A few weeks ago the heads of the four train service brotherhoods united in a statement to the public to the effect that nobody had any authority to say that they had decided that they either would or would not arbitrate. Their demands for an eight-hour basic pay day had not then been presented. Since then the demands have been presented. The public knows officially what they are. It knows that the railways will not grant them. The time for discussing arbitration is, therefore, at hand. In view of this, a statement issued recently by W. G. Lee, president of the Brotherhood of Railway Trainmen, to members of that organization is timely and significant. "It is evident from press reports that have been published," he says, "that some interest is endeavoring to cause the public and our membership to believe that arbitration will be accepted. Nothing of the kind is contemplated." Several leading newspapers have hastened to assure Mr. Lee that the "interest" back of the movement for arbitration is the public. The press is a unit in demanding arbitration; and it undoubtedly expresses public opinion. The railways unquestionably would accept arbitration on fair terms and by an impartial and competent tribunal. On the other hand, that certain of the labor leaders, especially the officers of the Brotherhood of Railway Trainmen and of the Brotherhood of Locomotive Firemen and Enginemen, are disposed to go to extremities, seems clear. If the members of their organization gained nothing else by a strike some of them would get the jobs of the older engineers and conductors. The railways are determined not to grant anything —certainly not without an arbitration of all the points involved. The leaders of the employees apparently are determined not to arbitrate. This creates a situation full of danger.

Will They Refuse to Arbitrate?

In view of the wide notoriety which certain patented forms of concrete design and construction have received recently, it is pertinent to consider the attitude which railway engineers assume toward such designs. It is the practice of the Patent office to issue papers to the first applicant who presents an idea not previously covered by other claims. Unfortunately this has resulted in a number of instances in their issuance for ideas of quite general knowledge to persons who are not the originators of these ideas but who are thus enabled to demand royalties from the users of these particular designs. In some instances these demands for royalties have not been made until the work has neared completion when it has been too late to alter the plans to escape the claims and the structure has been subjected to an unexpected charge. In other instances the monopoly created by the ownership of the patent has been used to impose exacting conditions. These practices have created a prejudice in the minds of many

Engineers and Patented Designs

railway men toward patented designs of all kinds and in some instances roads have gone to considerable trouble to avoid them. It is unfortunate that the course of some men has served to handicap others in the legitimate use of their patents. Most engineers will discriminate between a patented design of the first type and one sold on the basis of engineering services. Few men will question the right of a man to patent an entirely original design for an economical structure of any kind, in this way capitalizing the result of his ingenuity. If such a design is then sold on the basis of engineering services, after having proved its economy in comparison with other forms of construction, the patenting of it cannot be fairly condemned. There are many examples of designs handled in this way in the railway field and railway offices should distinguish between them and other designs handled in a way that may invite some just criticism.

DECREASED HAZARD IN RAILWAY TRAIN SERVICE

THE argument that railway train service employees are engaged in an especially hazardous occupation has been effectively used in securing advances in their wages in the past, and is included in many of the statements published in their behalf in connection with their present campaign for higher pay. It is undoubtedly a fact that the trainmen are paid wages so much higher than those of other railway employees, or than those of men engaged in other kinds of work, because of the risks attendant upon their employment. However, now that the wages of train employees have been increased nearly 40 per cent in 10 years, while the hazard has been steadily decreasing for several years, the subject loses its force in an argument for still higher wages.

The accompanying table, compiled from the accident statistics of the Interstate Commerce Commission, shows the number of fatalities to train service employees on the railways of the United States for the past 25 years and also the proportion of fatalities to the total number employed in each year. The commission's accident bulletin No. 56, for the fiscal year 1915, shows that there were less fatalities to trainmen and enginemen in that year than in any other year since the commission began to compile these statistics in 1890.

Year	Fatalities to Trainmen	Trainmen Employed for One Killed	Year	Fatalities to Trainmen	Trainmen Employed for One Killed
1890.....	1,459	105	1903.....	2,070	123
1891.....	1,533	104	1904.....	2,114	120
1892.....	1,503	113	1905.....	1,990	133
1893.....	1,567	115	1906.....	2,310	124
1894.....	1,029	156	1907.....	2,537	125
1895.....	1,017	155	1908.....	1,842	150
1896.....	1,073	152	1909.....	1,344	205
1897.....	976	165	1910.....	1,855	171
1898.....	1,141	150	1911.....	1,708	182
1899.....	1,155	155	1912.....	1,663	191
1900.....	1,396	137	1913.....	1,700	198
1901.....	1,537	136	1914.....	1,477	211
1902.....	1,674	135	1915.....	884	340

As the number of train employees has more than doubled in the 25 years, the relative improvement is even greater than that statement indicates. In 1915, when there were approximately 300,000 train employees on the railroads of the United States, the number killed was 884, or about one to every 340 train employees. In 1890, when there were only 153,000 train employees, the number killed was 1,459, or one to every 105 in service.

The increase in the safety of railway operation, as indicated by these statistics, is especially notable during the past 10 years. Less than half as many train employees were killed in 1915 as in 1905, although the number in service in 1915 was about 15 per cent greater. While the proportion of fatalities in 1905 was one to each 133 employed, in 1915 it was about one to each 340.

It will also be noted that the proportion has been decreased each year since 1910, from one in 171 to one in 340, while from 1914 to 1915 the proportion was reduced from one in 211, and the absolute reduction was 67 per cent.

The record of injuries does not make such a favorable showing because many trifling injuries are now reported which formerly were not taken into account, but the improvement as to fatalities is even more striking than is indicated by the table presented herewith, because since 1909 the figures include accidents to employees not on duty which were not included in the reports for earlier years.

HIGH CAPACITY FREIGHT CARS

WHILE there have been built from time to time in recent years freight cars of higher capacities, generally speaking, the 50-ton capacity car has maintained its supremacy among hopper and gondola cars. Cars of 70 tons capacity are used to some extent and one road, the Norfolk & Western, started the use of 90-ton gondola cars a few years ago and now has in service such a large number of them that figures comparing them with other coal-carrying cars may be instructive.

These cars are mounted on six-wheel trucks and have a light weight of 59,300 lb., with a carrying capacity, allowing 10 per cent for over load, of 198,900 lb. This makes the total weight of car and lading 258,200 lb., the revenue load being 77 per cent of the total load. Redesigning of the car with a view to reducing the weight without impairing its strength will probably result in bringing the weight down to 53,000 lb.; this reduction will raise the ratio of revenue load to total load to 79 per cent. Comparing this car with the 57½-ton steel hoppers in use on this road, it will be found that with the latter, which have four-wheel trucks, a light weight of 42,000 lb., a gross capacity of 126,000 lb. and a total weight of 168,000 lb., the ratio of revenue to total load is 75 per cent. The ordinary coal-train load on the Norfolk & Western is 5,000 tons, cars and lading included, and with the two extra pairs of wheels on each of the 90-ton cars, although there are fewer cars in the train than in a train of 57½-ton cars, the train resistance per ton should be about the same. Considering, then, the lighter design of the 90-ton car, there is an increase of 227 tons in the amount of coal in a 5,000-ton train as compared with a similar train composed of the 57½-ton hopper cars.

If we examine the figures for the average 50-ton hopper car used in similar trains we find that the ratio of revenue load to total load is 72 per cent, the difference in the amount of coal in the train in this case being 439 tons in favor of the 90-ton gondola. The 50-ton car considered has a light weight of 43,000 lb. and a total weight of 153,000 lb., allowing for 10 per cent overload. Again, as compared with a 70-ton hopper car mounted on four-wheel trucks and having a light weight of 46,000 lb. and a total weight of 200,000 lb., the ratio of revenue to total load is 77 per cent, which is very close to that of the 90-ton car, and the amount of coal in the train is the same as in the case of the heavier 90-ton car and about 120 tons less than that for the lighter 90-ton car. As compared with the lighter cars there is a saving in the length of a solid train of the 90-ton cars, this being, in the case of a solid train of the 50-ton cars, about 300 ft.; but as stated above, the two extra axles on the 90-ton car bring the train resistance to a figure approximately the same as that for some of the lighter cars. The axle load necessary with the 90-ton cars equipped with four-wheel instead of six-wheel trucks would be so high as to be prohibitive for general use, but the six-wheel trucks give a better distribution of weight as affecting the wheel loads, the weight per axle being 42,000 lb. as compared with 50,000 lb. in the case of the 70-ton hopper. While no great advantage is indicated by the figures of the 90-ton hopper over the 70-ton car, con-

ditions on the Norfolk & Western are more favorable to the employment of such high-capacity cars than they would be on many roads and the attainment of such a low weight in a car of the dimensions necessary in obtaining this capacity, and mounted on six-wheel trucks, is certainly a triumph for the designer.

THE LOOKOUT ON THE LOCOMOTIVE

JUDGING by all the criteria available to the outsider, the New York, New Haven & Hartford is a victim of ill luck. Its enginemen have made a succession of blunders which have resulted in horrible collisions, damaging the reputation of the road with the public, while yet these blunders are of the same kind that are committed elsewhere with less distressing results. The collision at Bradford, R. I., April 17, is of the same class as that at Milford, Conn., February 22; and now, as then, both the engineman and the fireman have good records.

It is not the purpose of this article either to excuse the road or its employees, or to propose a remedy; but rather to call to mind some of the conditions which it is necessary to meet in order to secure satisfactory obedience to signals; some of the difficulties that confront the officer who sets out to establish perfect conditions in this respect; and further, to suggest the difficulties which confront the public officer in his attempts to judge of the conduct or policy of the railroad officers.

Satisfactory obedience to signals means the best service of a large body of competent men, under all sorts of conditions. Everybody, from superintendent to fireman, must strive for perfection. A single error causes a great disaster. When the enormous traffic of the railways of Great Britain was carried on for a period of 15 months with no passenger killed in a train accident, it looked as though something approaching perfection might be practicable; but that hope has vanished. Prior to the *Titanic* disaster the Atlantic liners were called about the safest passenger conveyances known, but that idea also proved to be wrong. Still, every enterprising railroad officer has his ideal of a force of engine runners who can be depended on in all circumstances, and with equal confidence, year after year.

Perfection of locomotive lookout service means, to the superintendent, first-class fitness for the work, on the part of *every one* of his scores or hundreds of runners. As long as dependence is placed on the rule requiring joint observance of signals, the ideal includes intelligent, conscientious and well-trained firemen. Both classes must be drilled in the rules and be watched (at work) by sharp-eyed road-foremen until they give evidence of fitness for their jobs. This watching has to be continued indefinitely. The conscientious engineman, fully alive to the gravity of his responsibilities, approves the severest efficiency tests that can be made. Yes, more; he would demand them, if not provided, or would impose them on himself; for a single lapse may mean his own death.

Human nature being what it is, every force of runners, with possibly rare exceptions, has among its number some who are of the wrong temperament, or whose efficiency is impaired by love of wandering (or indifference to dismissal or other discipline); and it has a considerable proportion of men who have not the courage to report dangerous practices —although on a large road such reporting is vital to safe operation. The superintendent, therefore, who aims to keep the morale of the force high must have a rigid system of putting only the best men on the most important trains; and of rules, never to be broken, forbidding men to go on duty when sick or tired or worried; and such intimate relations between all the runners and high-grade road-foremen and trainmasters that any cause of friction or dissatisfaction will be discovered and removed at its inception. An uneasy mind, no matter to what it is due, may be the cause of a lapse in keeping a lookout. The rule not to converse in the cab is essential to the best service; but it takes a pretty strong character to adhere to it when worried or anxious. It takes very strong character in foremen to call to account high-spirited enginemen for small lapses; and yet the most careful attention to small lapses is one of the vital features of perfect discipline. The very best lecturing on the rules comes short of having a satisfactory and visible effect, except as it is enforced by vivid illustrations of the good results of vigilance and the bad results of second-rate devotion to duty. The difference between second rate and first rate is often so small that it is not appreciated, except after very careful study.

The fireman's job is in some respects a difficult one. This makes it quite a problem to get entirely satisfactory men for it, and yet, the dependence on him is an important link in the chain that is depended on for safety. His work is often hard, and the chief amelioration of its hardness is the hope of promotion, which may be very long deferred. To have the best conditions, the runner and the fireman should be not only well acquainted with each other and friendly, but should have worked together a long time; but with seniority rules and other obstacles this is a matter in which perfection is never easily attained. Most firemen get very good pay; but it is the easiest thing in the world for the two men in the cab to forget their duties for a brief time in discussing the *badness* of their pay. Unfriendly thoughts toward their employer are indulged in by a good many railroad employees of pretty high grade, and it takes much discipline on the part of themselves and their superiors to neutralize this poison.

Now, without going further into details—details with which most of our readers may be supposed to be well acquainted—the point is that only the men who are on the ground and are very familiar with the life of the operating department can judge of the degree of success with which any road carries out the very high standards that are here outlined and that are necessary to secure satisfactory service. Whether the New Haven road has or has not succeeded in securing the best possible engine service, is a question which no commission or governmental body is likely to settle. The evidence, pro or con, is too voluminous and too difficult to formulate. It is far beyond the capacity of anyone outside the service to study, with useful results. Since the disasters of two years ago the New Haven road has given what may be called very unusual attention to the discipline of both enginemen and firemen; and, as was said at the beginning of this article, bad results seem to have followed good work. The training of the men seems to have been carried out with intelligence, persistence and disregard of expense or other obstacles, so far as an investigating commission can discover.

The two reports on the Milford collision had no criticism on this score. The fact remains, however, that many of those elements of perfect service which we have just mentioned are mostly beyond the reach of the ordinary "investigation"; and to put a value on this work with men, as the government is valuing the railroads' physical property, would be impossible. A railroad officer skilled in psychology might study a dozen, or a hundred enginemen and tell us something about their personalities; but that such a process could be applied to 500 or a thousand men, and the results made usefully available, is unimaginable.

But this theoretical efficiency of the New Haven's operating department affords little satisfaction to those who suffer from a train disaster; and something more is called for. The

moral of the Bradford collision is substantially the same as that of hundreds of other cases of the same class; but its lesson gives added force to the truth that if the engineman's failure is due to any deficiency in the management of the personnel of the train service, it is to the officers of the road, not to investigators from Washington or elsewhere, that the public must look for relief. It is not to be supposed that the management of the road would claim that its operating department has accomplished absolute perfection; and therefore it is not to be assumed that "ill luck" is a *complete* explanation of its misfortunes; but to get any further light on the matter will require very much more than the stereotyped investigation. In view of the frankness with which the officers have met all public inquiries this may be said without prejudice. It is not to be supposed that there is anything which they desire to conceal.

RAIL PRICE MAINTAINING POLICY ABANDONED

IN the 15 years prior to 1902 the price of steel rails fluctuated continually, varying from as high as $37 a ton to as low as $17.62. In 1902, shortly after the formation of the United States Steel Corporation, the price was fixed at $28 per ton for Bessemer rails. During the 15 years since then, regardless of all changes in the prices of other iron and steel products, that of rails has been stationary. The policy of maintaining the price since 1907, during most of which time there has been business depression, and the prices of other iron and steel products have gone down, has been defended on the ground that there was no advance in the price in the years before 1907, when general business was good. Recently the prices of all iron and steel products have greatly advanced; and now there is announced an increase of $5 per ton in the price of rails.

The policy of keeping the price of rails stationary was followed while it was advantageous to the manufacturers. It was defended then on the ground that it was beneficial to all concerned, including the public. It has been abandoned when it has ceased to be advantageous to the manufacturers. If the foregoing statements of fact sound like a criticism of the policy of the manufacturers it is because the facts do not seem consistent with each other.

Great efforts have been made within recent years to educate the American public to an appreciation of the benefits of "big business." The *Railway Age Gazette* has more or less participated in this. The course which the steel companies have taken in reference to this particular matter illustrates the point that the persons who make it hardest to defend "big business" are not those who attack it, but those who shape its policies. It is an unfortunate fact, which is given illustration every day, that many men who have great executive ability and capacity for making money show want of foresight and common sense when confronted with the necessity of dealing with questions the settlement of which will influence public opinion. This increase in the price of rails makes the arguments presented in the past in defense of the policy of maintaining prices seem hypocritical. It indicates that they were intended not as a defense of a public policy, but of a monopoly policy; and they will be used with great force against contentions in favor of a protective tariff after the war in Europe is over.

The relationship of supply and demand probably justifies the present increase in the price of rails. If it does, what justification was there for suspending the operation of the economic law of supply and demand when, in the absence of monopolistic conditions, it would have resulted in a reduction of prices? We repeat, that those who do the most to make "big business" in all fields hard to defend are those who are responsible for its policies.

Letters to the Editor

THE LATE MR. VOORHEES AND THE ATLANTIC CITY EXPRESS

LONDON, ENG.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I am surprised to see that in the obituary notice of my old friend, Theodore Voorhees, no mention is made of his responsibility for the Atlantic City Expresses. The Empire State Express is a very creditable train, but there are scores as fast, and not a few much faster, though not, I admit, for equally long distances, in England and in France. But the Atlantic City flyers of the Reading road (55 miles in 49 minutes was the original time, which, as far as I know, is still adhered to) were a railway wonder when first introduced; and still remain unapproached except by the performances on the Pennsylvania alongside.

I well remember the feeling of awe with which I checked the passage of the mile posts with a stop watch from the engine cab in, I think, the summer of 1897. I remember, too, when at the International Railway Congress in Washington in 1905 I pointed out to Mr. Voorhees that an excursion to Atlantic City on one of his trains was not in the programme. "You bring the men and I will run the train," was his answer. And on the following Sunday morning I brought a party, mainly of English friends. The train was made up of the ordinary number of coaches, with the ordinary engine of the Atlantic type—a compound, if I remember right. The journey to Atlantic City was done in 46½ minutes. And, when I went up to congratulate the engineer, he seemed far from satisfied with what he had accomplished. Coming back I sat beside an English superintendent, and watched him "clocking" the speed. When the watch got down below 40 seconds to the mile, and stayed there for several miles on end, my friend seemed to fancy that something had gone wrong with the hands. But he cannot have been far wrong, for we pulled up at Camden Station in 42½ minutes from the start. Personally, I doubt whether any other train has ever run so great a distance at so high a speed, either before or since.

How many million extra hours of fresh air at Atlantic City the citizens of America owe to the bold speed innovation of Mr. Voorhees I leave the statisticians to calculate.

W. M. ACWORTH.

FAILURE TO LOWER SHADES AS PRECAUTION AGAINST ZEPPELINS.—A number of railway passengers were fined 10s. ($2.50) each at Birmingham (England) recently for failing to keep the blinds of railway carriage windows lowered when traveling.

MOSCOW TO ARCHANGEL BY "WAGONS-LITS."—The Compagnie Internationale des Wagons-Lits et des Grands Express Europeens announces that the new through sleeping-car service between Moscow and Archangel has been inaugurated. The Archangel express leaves Moscow daily at 5 p. m.; arrives at Yaroslavl at 10:47 p. m.; at Vologda at 6:44 a. m.; at Niandoma at 7:06 p. m.; and at Archangel at 8:20 a. m. on the second morning. The Moscow train leaves Archangel at 7:40 p. m., and arrives at its destination at 11:10 a. m. on the second day. This journey of about 39½ hours, for a distance of 700 miles is a great improvement on the old service which involved an uncertain break at Vologda, where the old narrow gage line to Archangel began. Restaurant cars will also be run between Moscow and Niandoma and vice versa. Niandoma is about 200 miles from Archangel.

Studies in Operation—The Erie Railroad

Rehabilitation of a Trunk Line and Its Establishment as a Respected Competitor of the Pennsylvania

THE Erie is today a low-grade, double-track modern road, with a main line running from New York city to Chicago, and operating a total of 2,257 miles of line. Its history since 1902 is unique, in that it is the only instance in American railroad history where a large system with a funded debt, utterly disproportionate to the value of the property, has been rehabilitated without the intervention of the courts and a receivership or without reorganization. In the years prior to 1902 not only did the Erie have a top-heavy load of bonds, but its credit was almost exhausted, its service a by-word and a joke, and its physical condition such as to make its operation uneconomical. The morale of its organization was correspondingly bad. The history of the development of the Erie Railroad since then is in considerable part the account of the domination of one man's personality, sound common sense and persistence in the face of an unusually large proportion of "unsurmountable difficulties."

The Erie pulled itself out of its hole by its own boot straps; or, to put it in another way, its rehabilitation went on "under traffic." The physical condition of the road was such as to make it impossible to effect economies in operation without the additional investment of large sums of money. With the small margin of earnings above fixed charges, the company's credit was such as to preclude the possibility of any large issue of securities to provide funds for a general program of additions and betterments. It was, moreover, a hopeless-looking task to try to compete with two rich roads like the New York Central and the Pennsylvania for Chicago and New York business. Before the service and the economy of operation could be much improved, modern facilities would have to be provided, and this was a question of establishing credit, and so the circle of "impossibilities" was complete.

In 1902 Frederick D. Underwood was made president, and among the first things he did was to gain the confidence of his board of directors so securely that he held it even through the trying times of 1907 and 1908, when the Erie was so hard pressed that at one time there was nothing that stood between it and receivership but the late E. H. Harriman's personal check. This backing which the president of the company obtained from his board of directors, has been of great importance in the success of the development of the property. There have been numerous instances where a board of directors could be carried, by a more or less temporary burst of confidence, into granting authority to inaugurate a large system of expensive improvements, but the Erie's case demanded a continuing faith in the face of difficulties which arose one after another, year in and year out, for a long period of time. The program of physical betterment had to be carried out bit by bit as the money could be raised. There probably was the temptation to make some improvement when money became available that would have an immediate effect easily recognizable in the more economical operation of some part of the system rather than to adhere strictly to a plan of improvement, the full benefit from which would not be derived until the greater part of it was carried out. If this was a temptation, however, it was not yielded to. The keynote, as will be seen when each improvement is taken up more in detail to the upbuilding of the Erie, has been the orderly carrying out of a plan adopted after careful consideration, and thereafter adhered to strictly.

A preliminary comparison of certain general figures for 1902 and 1915[1] will give a basis on which to found a more detailed description.

The mileage operated in 1902 was 2,154; in 1915, 2,257. Of the mileage 30.33 per cent had second track in 1902, and 50.93 per cent had second track in 1915. Total operating revenues in 1902[2] amounted to $38,409,000, and in 1915 to $66,437,000. Operating expenses in 1902 amounted to $25,642,000, and in 1915 to $45,671,000. The operating ratio in 1902 was 66.77; in 1915, 65.35. Taxes in 1902 amounted to $1,028,000; in 1915 to $2,206,000. Operating income, that is, the amount available for rentals, interest charges and dividends to the stockholders, amounted to $12,718,000 in 1902, and to $20,766,000 in 1915. Interest charges and rentals in 1902 amounted to $10,278,365; in 1915 to $14,994,000. The total ton mileage of revenue freight in 1902 was 4,756,340,000; in 1915, 8,564,634,000. The total freight train mileage in 1902 was 12,633,000; the total freight train mileage in 1915 was 12,442,000. The total number of passengers carried one mile in 1902 was 524,679,000; in 1915, 590,653,000. The passenger train

[1]The 1915 figures are for the calendar year ended December 31; the 1902 figures are for the fiscal year ended June 30, 1902. The Erie changed its fiscal year from June 30 to December 31, in 1914.

[2]Both earnings and expenses from outside operations are excluded from the 1902 figures, but included in the 1915 figures. Throughout this discussion adjustments have had to be made, but an attempt has been made to preserve the accuracy of the ratios, as, in this case, the operating ratio.

mileage in the year 1902 was 8,515,000; in 1905 it was 9,705,000.

The Situation in 1902

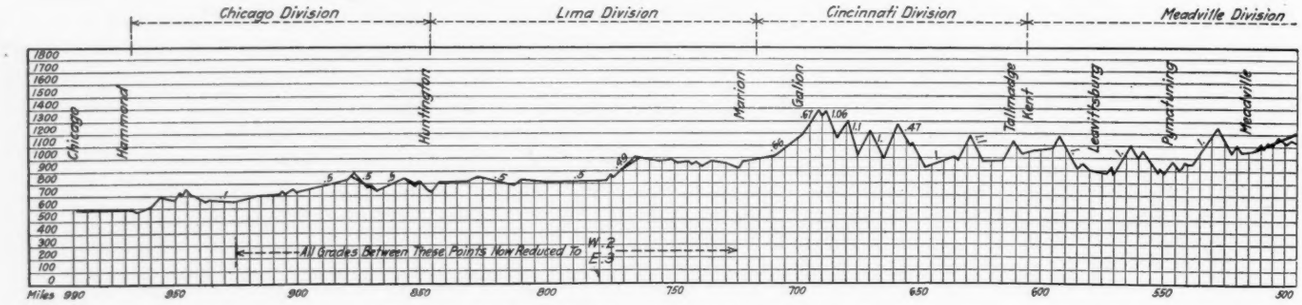
The great possibilities of the Erie as a profitable trunk line between New York and Chicago had been recognized by investors and speculators since before Jay Gould's time. These possibilities, however, instead of being realized by the construction, maintenance and operation of as good a railroad as money and organization could secure, were used to form the basis of various Stock Exchange speculations. Subsequent to Jay Gould's time the bad effects of a piled-up funded debt stifled any important betterment of the property. In 1902 shippers in Chicago were hardly aware that the Erie was a competing railroad with the other trunk lines. The management was in New York and every question had to be referred to headquarters. Passenger service was in general very poor. The Erie's through "Vestibule Limited" from Jersey City to Chicago was a 28-hour train, comparing with the New York Central's 20-hour "Twentieth Century." Suburban service out of New York compared most unfavorably with that of the Delaware, Lackawanna & Western, the Central of New Jersey and the Pennsylvania; and as to freight service, the lack of aggressive solicitation of Chicago-New York freight has already been mentioned. The Erie was also under certain disabilities as regards freight from the Pittsburgh district, and its service was not such as to give any particular advantage on competitive business between any important points.

One well recognized fact was that the company did not have the facilities to give a better service or to render the service that it was giving at a lower expense of operation.

As already stated Frederick Underwood became president in 1902 of the Erie, and in the following year Daniel Willard was made vice-president in charge of operation. A plan was laid out for the eventual establishment of a double-track railroad between Jersey City and Chicago which would have a 0.2 per cent maximum grade east and 0.6 per cent maximum grade west, between Jersey City and Port Jervis, N. Y., except for one helper grade; and between Port Jervis and Chicago a maximum grade of 0.3 per cent both east and west. This plan called also for an open cut to supplement the double-track tunnel through Bergen hill, just back of Jersey City. The four most expensive pieces of work necessary to carry out this general plan were the Bergen hill cut; the construction of the Erie & Jersey, a 42-mile double-track line from Highland Mills, N. Y., to Mount Hope, which included the driving of a double-track tunnel 5,300 ft. long at Otisville; the construction of the Genesee River Railroad, a low-grade, single-track line from Cuba, N. Y., on the Allegheny division of the Erie, to Hunts, on the Buffalo division, 33 miles; and double-tracking, with grade revision, at various places. During the course of the working out of this general plan, there was a gradual substitution of heavier locomotives for the locomotives which were in service in 1902. This work of gradual improvement of facilities along carefully thought-out lines can best be described by taking each division separately.

Additions and Betterments to Roadway and Locomotives

New York Division.—The main line of the New York division is 90 miles long, running from Jersey City, N. J., to Port Jervis, N. Y. This was a double-track line in 1902, but, as previously mentioned, it ran out of Jersey City through a double-track tunnel under Bergen hill, and between Highland Mills and Mount Hope the ruling grades were 1.4 per cent eastbound and 1.5 per cent westbound. The standard type of locomotive in heavy freight service on this division in 1902 was a 2-8-0 type, weighing 233,500 lb., with a tractive effort of 24,952 lb. Approximately $4,230,000 was spent on the Bergen hill cut, and the Penhorn Creek Railroad; approximately $7,729,000 was spent on the Erie & Jersey. This Erie & Jersey, while a little longer than the old line between Highland Mills and Mount Hope, reduced the grades to 0.5 per cent eastbound and 1 per cent westbound. The old double-track line was continued in use for passenger service, and the new line is used for heavy freight service. For the 2-8-0 locomotives there have been substituted in heavy freight service Mallets weighing 484,570 lb., with a tractive effort of 57,543 lb. The result has been that the full trainload eastbound has been increased from 556 tons in 1902 to 3,193 tons in 1915,



Profile of the Erie Showing Old and New Grades

and westbound from 520 tons to 1,812 tons. In addition to the Bergen hill cut and the Erie & Jersey, there was $1,377,000 spent on yard and terminal improvements, $1,701,000 on dock and pier improvements, $537,000 on bridge improvements, $582,000 on station improvements, and $271,000 on automatic block signals, a total expenditure, between 1901 and 1915, of about $16,700,000.

Delaware Division.—The Delaware Division runs from Port Jervis, N. Y., to Susquehanna, Pa., 104 miles. In 1902 the ruling grades on this division were 0.2 per cent eastbound and 0.3 per cent westbound, and since the division was all double-tracked in 1902, the only considerable expenditures for improvements were $440,000 spent on shops, and $224,000 on automatic block signals, the total expenditure for the division being $838,000. In 1902 the locomotives in use for heavy freight service were 4-6-0 type, weighing 265,000 lb., with a tractive effort of 24,154 lb. For these have been substituted 2-6-2 type locomotives, weighing 433,000 lb. and with a tractive effort of 43,116 lb. By the substitution of these heavy locomotives the full trainload eastbound has been brought up from 2,285 tons to 4,118 tons, and westbound from 1,839 tons to 3,311 tons.

Susquehanna Division.—The main line of the Susquehanna division runs from Susquehanna, Pa., to Hornell, N. Y., 136 miles. The ruling grades on this division, in 1902, as on the Delaware division, were 0.2 per cent east and 0.3 per cent west, and the entire main line was double-tracked. There are five important junctions, however, on this division, and besides an expenditure of $646,000 for

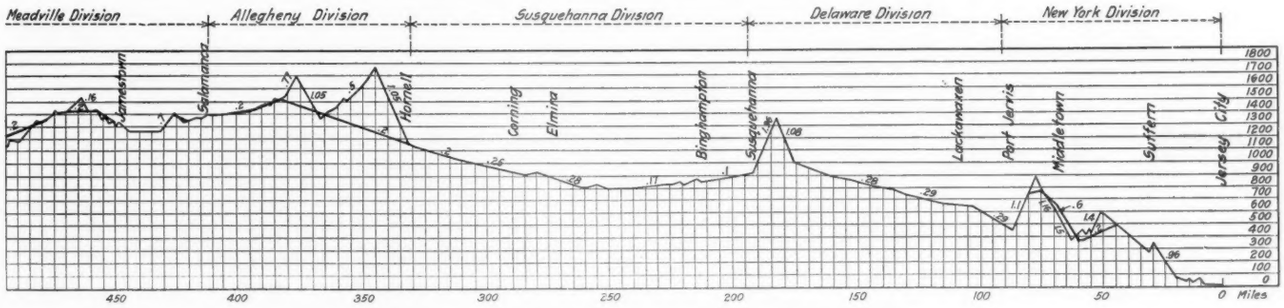
shop improvements, there was $223,000 spent for yard and terminal improvements. In addition there was $232,000 spent for bridge improvements and $268,000 on automatic block signals, the total expenditure for the division being $1,627,000. In 1902 the standard locomotive in heavy freight service was a 2-8-0 type, weighing 233,500 lb., with a tractive effort of 24,952 lb. For this has been substituted a 2-8-0, weighing 321,000 lb., with a tractive effort of 31,865 lb. The gain in trainloading has been from 2,642 tons eastbound to 3,812 tons, and westbound from 1,914 tons to 3,071 tons.

Allegheny Division.—The Allegheny division from Hornell to Salamanca is only 80 miles long, but in all the division has 350 miles of main line. The ruling grade eastbound in 1902 was 0.8 per cent and westbound 1 per cent. By the building of the single-track 33-mile Genessee River Railroad, and by grade reduction from Hornell, N. Y., to Hunts, and grade reduction and the building of second-tracked from Cuba, N. Y., to Allegheny, Pa., the ruling grade has been reduced to 0.2 eastbound and 0.3 westbound. There was, up to 1914, 6,727,000 spent on the Genessee River Railroad. The grade reduction from Hornell to Hunts cost $313,000, and grade reduction and second-track from Cuba to Allegheny $283,000. There was also $135,000 spent for yard and terminal improvements, the total expenditure on the division being $7,574,000; and expenditures are still being made and will have to continue to be made on the Genessee River Railroad because of the nature of the country, which is such as to make fills very hard to maintain. In 1902 2-8-0 type locomotives, weighing 348,000 lb., and with a tractive effort of 34,141 lb., were in heavy freight service, and these have been replaced with 2-8-0 locomotives, weighing 339,000 lb., with a tractive effort of 39,969 lb. The trainload eastbound has been increased from 1,350 tons to 3,812 tons, and westbound from 1,106 tons to 3,071 tons.

Meadville Division.—The Meadville division runs from Salamanca, N. Y., to Pymatuning, Pa.; from Pymatuning to Leavittsburg, Ohio, and from Leavittsburg to Kent, the total distance between terminals being 103 miles by the old line and 107 miles by the new line. The new line is via the Columbus & Erie. The building of this line, which cost $1,365,000, did not reduce the grades any, but was in purpose a second-track from Niobe Junction to Columbus Junction. There was $441,000 spent on grade reduction and second-track from Salamanca, N. Y., to Steamburg, and $3,036,000 on second-track from Concord, Pa., to Meadville, and $397,000 on second-track from Braceville, Ohio, to Kent. On this division in 1902 there was 134 miles of single-track. There is still about nine miles of single-track, which will probably in time be eliminated. There was $438,000 spent on shop improvements and $234,000 on yard and terminal improvements. The total expenditure on the division between 1901 and 1915 was $6,273,000. The ruling grade has remained the same—1 per cent both eastbound and westbound. There has been, however, an elimination of grades which made the total rise and fall in feet on the division 1,962 in 1915, as compared with 2,356 in 1902. In heavy freight service the 2-8-0 type locomotives, weighing 321,000 lb., and with 31,865 lb. tractive power, in use in 1902, have been replaced with Mallets, weighing 484,570 lb., and with 57,543 lb. tractive power. The trainload in 1902 was 976 tons, both east and westbound, and has been increased to 1,812 tons both ways.

Cincinnati Division—The Cincinnati division runs from Kent, Ohio, to Marion, 113 miles. Almost the entire divison was single-track in 1902, and is now double-track,[3] the total amount spent on double-track being $1,569,000. On this division there was $590,000 spent for shop improvements, $352,000 for yard and terminal improvements, and $204,000 for automatic block signals. The total amount spent on the division was $3,043,000. The ruling grade has remained the same since 1902—1.1 per cent. In 1902 the 2-8-0 type locomotives, weighing 348,000 lb., were in heavy freight service eastbound, and the 2-8-0 type, weighing 180,400 lb., were in heavy freight service westbound. These have been replaced with the Mallets, weighing 484,570 lb., and with 57,543 lb. tractive effort. The trainload eastbound has been increased from 1,011 tons to 1,661 tons, and westbound from 594 tons to 1,138 tons.

Chicago and Lima Divisions.—The Chicago and Lima divisions run from Marion, Ohio, to Hammond, 243 miles. This was nearly all single-tracked in 1902, and has been double-tracked from Marion to Lomax, Ind., at a cost of $6,668,000. The double-tracking included grade reduction from 0.5 per cent eastbound to 0.3 per cent eastbound, and from 0.5 per cent westbound to 0.2 per cent westbound. On these divisions there still remains 35 miles of single-track from Lomax to Griffith. The double-tracking of these divisions with the accompanying grade reduction, all done under a traffic which was overtaxing the single line, even when no construction work interfered with it, was an achievement of co-operation between engineering forces and operating forces that forms a very interesting chapter in the history of the rebuilding of the Erie. There were at one time 21 turnouts in use, 25 work trains out, and 21 steam shovels at work. There was $333,000 spent on shop improvements and $540,000 on yard and terminal improvements, and $201,000 on automatic block signals, the total spent on these two divisions being $7,826,000.



Profile of the Erie Showing Old and New Grades

How the Money Was Raised

Between December 1, 1895, when the property of the Erie was taken out of the hands of receivers and operation was begun by the present company, up to June 30, 1902, the company had received $14,455,628 cash from the sale of various classes of securities. There had been spent $4,960,575 for new construction, and $9,001,887 for new equipment

[3]The Cleveland, Cincinnati, Chicago & St. Louis, which parallels the Erie from Galion, Ohio, to Marion, is used by both companies as an eastbound track and the Erie's single-track line between these points is used by both as a westbound track.

and various amounts for other capital purposes, making a total of $16,688,291. Between June 30, 1902, and December 31, 1915, an additional $30,389,000 of securities and equipment trust certificates had been sold, and $68,484,000 had been spent for new construction and equipment. The total amount spent between June, 1902, and December, 1915, was $37,094,675 from current cash for construction and equipment purposes, for which the company has not been reimbursed through the sale of securities. This includes the cost of locomotives and cars bought under equipment trust plans and not as yet fully paid for. The Erie at the end of 1915 had outstanding $13,166,983 equipment obligations. The principal vehicle which the Erie has had for financing its needs is what is called its first consolidated mortgage. Under this mortgage there is authorized a total of $175,000,000 bonds, of which $35,000,000 are prior in lien to the rest. All of these prior lien bonds have now been sold, and $51,724,000 of the general lien bonds have been sold.

During the course of carrying out its general plan of making a low-grade, double-track trunk line out of the old Erie, the management had to weather the financial panic of 1906-07. One of the most dramatic incidents in all American railroad financial history is that connected with the rescue of the Erie from receivership on April 8, 1908. On that day the company had $5,500,000 notes fall due. Holders were asked to exchange their notes for new short-term notes, but as the day wore on it became evident that a sufficient number of the holders were not going to make the exchange to permit of refunding in this way. When receivership appeared almost inevitable, the late E. H. Harriman bought from the company $5,500,000 notes, and arrangements were made through him for the sale of $5,000,000 additional notes for cash. For the next six years the Erie was virtually operated under a friendly agreement with its creditors by which it agreed to put into the property all surplus above interest charges.

While it is true that the operating results might have been obtained if a receivership had taken place, and while it is true that the success of the financial plan would not have been possible without the results obtained by the operating management, yet the financing of the road during its period of upbuilding is a part of the story of the Erie rehabilitation which belongs with the account of the physical betterments and improved facilities. Previous to the election of Mr. Underwood as president much of the Erie financing had been done by J. P. Morgan & Co., and at the time of Mr. Underwood's election the board was apparently dominated by Morgan interests. In the following year E. H. Harriman became a director, and in 1905 George F. Baker, of the First National Bank, also became a director. In 1909 George W. Perkins succeeded James N. Hill, E. H. Gary succeeded Alexander E. Orr, L. F. Loree succeeded Louis L. Stanton, and R. S. Lovett succeeded William C. Lane. E. H. Harriman died in September, 1909, and was succeeded by Charles A. Peabody, but the policy which had been adopted by the board of directors while Harriman was a member of the executive committee had weathered its most trying time and the confidence of the board of directors in Frederick Underwood's ability to carry out this plan had been so firmly established that Mr. Harriman's death caused no interruption in the progress which was being made. The Erie, however, unquestionably owes to Mr. Harriman and to his more immediate associates—Mr. Loree and Judge Lovett—much as regards the breadth and scope of the plan of rehabilitation and the tenacity with which it was adhered to under the most trying circumstances.

The Erie is not entirely out of the woods yet as regards its financing, but the foundation for sound financing has been provided in a road with an operating ratio of 65.35 per cent, and with revenues averaging, in 1915, $26,576 per mile. It should be mentioned that the two most expensive pieces of construction work which the Erie had to do—the Erie & Jersey and the Genessee River Railroad—were paid for out of current funds and by means of current loans and

AVERAGE MILES PER CAR PER DAY—CALENDAR YEARS 1915-1914-1913

LINES WEST.

Months.	Meadville 1915	1914	1913	Mahoning 1915	1914	1913	Cincinnati 1915	1914	1913	Chicago & Erie 1915	1914	1913	Ohio Division 1915	1914	1913	Erie System 1915	1914	1913	N. Y. S. & W. 1915	1914	1913
January	69.35	64.45	54.93	4.00	4.06	5.52	23.36	22.54	22.48	38.88	39.98	34.89	26.33	25.43	24.98	27.57	26.71	25.20	9.62	11.22	10.39
February	79.88	66.55	56.10	4.31	4.65	4.97	26.89	21.67	20.85	45.31	36.29	36.40	28.99	24.80	24.79	29.09	25.33	25.16	9.54	8.83	9.86
March	77.34	67,98	49.62	4.30	5.35	4.31	28.48	24.49	17.12	49.17	40.85	30.26	29.70	27.79	21.27	28.69	27.38	22.91	10.27	9.35	9.42
April	76.58	70.68	51.68	4.72	5.10	5.58	26.81	25.13	19.80	48.79	42.44	33.48	28.30	26.69	22.96	29.60	26.13	24.78	9.25	10.00	10.26
May	81.44	62.03	57.32	7.17	5.98	6.84	28.07	22.98	23.15	50.48	35.14	36.58	31.05	24.40	24.51	30.45	25.95	26.59	9.43	10.97	8.29
June	69.11	58.82	57.26	7.26	6.70	7.25	26.99	23.32	23.50	40.67	37.71	36.17	28.90	24.91	24.55	29.08	27.26	25.86	11.17	11.04	9.56
July	64.10	57.81	60.82	8.23	7.76	6.42	26.90	23.55	22.21	39.62	40.14	34.49	29.32	25.73	23.77	30.40	27.12	24.70	10.66	11.10	10.54
August	67.70	70.62	53.91	9.35	7.49	6.16	27.73	22.54	20.53	44.02	43.44	31.37	31.56	27.09	22.29	31.77	27.79	25.08	11.12	10.83	9.89
September	72.27	86.90	56.00	8.17	6.79	6.46	29.46	25.33	19.07	58.58	51.26	34.15	33.37	30.03	22.31	33.27	30.44	25.01	12.50	11.22	10.96
October	.....	77,92	53.26	.....	6.95	7.30	.....	24.53	20.36	.....	45.49	36.34	.....	28.82	24.61	.....	30.93	26.74	.....	12.23	11.64
November	.....	70.10	61.56	.....	5.83	6.40	.....	24.23	22.06	.....	35.52	34.06	.....	26.16	25.21	.....	28.36	28.62	.....	10.62	10.73
December	.....	64.17	65.86	.....	3.58	5.01	.....	23.42	23.40	.....	30.96	34.61	.....	24.34	26.41	.....	26.13	29.09	.....	10.45	10.42
Best previous av.	Sept., 1914, 86.90			May, 1910, 11.20			March, 1915, 28.48			Oct., 1911, 56.23			Aug., 1915, 31.56			Aug., 1915, 31.77			Oct., 1914, 12.23		

LINES EAST.

Months.	New York 1915	1914	1913	Delaware 1915	1914	1913	Wyoming 1915	1914	1913	Jefferson 1915	1914	1913	Susquehanna 1915	1914	1913	Rochester 1915	1914	1913	Buffalo 1915	1914	1913
January	28.65	27.29	25.26	87.55	82.57	89.44	10.37	22.23	20.91	28.25	26.29	39.20	56.19	51.63	48.60	21.14	20.25	22.19	16.42	16.94	11.76
February	28.39	22.39	24.89	95.05	84.27	91.53	11.51	17.55	21.90	23.60	24.06	44.26	68.79	50.85	44.63	23.87	19.00	24.48	15.82	15.66	11.44
March	29.03	25.25	24.25	98.49	78.23	80.84	10.47	15.75	20.10	24.70	30.97	43.94	65.32	59.25	45.95	23.48	19.22	20.04	15.42	16.38	12.34
April	30.44	25.11	25.97	97.53	88.37	78.48	16.88	16.46	21.15	35.14	27.25	32.60	64.69	60.25	49.03	30.04	24.84	23.46	16.35	13.26	13.17
May	30.65	25.79	26.10	100.72	87.81	89.30	12.42	16.54	22.07	26.05	41.58	40.84	66.27	57.74	53.69	27.41	23.88	22.20	17.32	15.41	15.33
June	28.91	26.16	24.86	93 73	87.50	82.19	13.01	20.49	22.80	34.73	48.04	61.32	62.97	64.91	50.84	26.28	24.37	20.37	16.49	16.22	15.36
July	29.35	24.75	23.08	91.63	72.31	73.18	13.16	13.28	19.18	35.05	58.84	50.73	64.97	64.54	49.13	27.19	23.45	19.81	16.94	15.72	14.89
August	30.16	23.81	26.03	88.23	74.25	73.36	15.68	18.50	22.99	43.80	38.22	47.69	74.19	65.76	52.18	23.64	22.73	21.35	17.35	16,21	14.35
September	29.77	26.50	25.88	113.38	84.95	78.49	17.39	18.97	19.86	40.64	41.29	38.81	77.48	66.70	47.94	26.54	25.31	20.80	19.29	18.33	15.73
October	.....	26.92	26.54	.....	82.08	82.34	.....	19.56	21.67	.....	35.71	39.21	.....	73.13	52.93	.....	26.41	22.01	.....	20.68	16.84
November	.....	27.19	27.51	.....	93.78	95.24	.....	12.70	21.36	.....	31.71	36.38	.....	72.70	66.68	.....	20.36	20.09	.....	18.52	17.81
December	.....	25.47	29.67	.....	74.79	98.26	.....	13.44	20.89	.....	27.12	33.00	.....	59 09	57.74	.....	20.65	20.28	.....	17.03	19.36
Best previous av.	May, 1915, 30.65			May, 1915, 100.72			March, 1912, 24.64			June, 1913, 61.32			Aug., 1915, 74.19			April, 1915, 30.04			Oct., 1914, 20.68		

Months.	Alleg. & Brad. 1915	1914	1913	Erie Division 1915	1914	1913
January	44.20	32.40	44.93	28.48	27.74	25.23
February	44.58	35.50	44.81	29.15	25.73	25.30
March	36.74	40.93	33.15	27.99	27.08	24.08
April	49.94	33.54	43.32	30.56	25.70	26.12
May	49.87	33.56	41.20	30.05	27.22	28.05
June	52.55	39.49	37.19	29.23	29.10	26.86
July	62.07	43.53	40.23	31.28	28.20	25.44
August	55.57	42.70	40.59	31.95	28.36	27.49
September	55.45	45.19	37.49	33.05	30.74	27.19
October	.....	50.64	36.56	.....	32.53	28.30
November	.....	43.45	45.02	.....	30.04	31.32
December	.....	43.40	42.64	.....	27.53	31.29
Best previous average	July, 1915, 62.07			Oct., 1914, 32.53		

Includes all cars except those condemned and those permanently assigned to Maintenance of Way Service.

were then permanently financed by the sale of two issues of first mortgage bonds, one secured directly on the Erie & Jersey and the other directly on the Genessee River Railroad.

Since January, 1906, no long-term financing was or could have been done by the Erie, except the recent sale of the Erie & Jersey divisional bonds and the Genessee River Railroad divisional bonds and the sale of $1,000,000 Pennsylvania collateral bonds. Corporate financing had to be done by the issuance and renewal of several series of short-term notes bearing a relatively high rate of interest and secured by pledges of various treasury assets, including convertible and general lien bonds. For the rest the surplus earnings were used as indicated above.

Negotiations are now under way for the sale of $19,627,000 convertible bonds, secured by the general mortgage to be convertible $1,000 bonds for $2,000 par value stock.

Utilization of Facilities to Secure Additional Revenue

Just as the lack of facilities makes it all the harder to secure additional business, and the lack of business all the harder to secure additional facilities, so in the case of the Erie the addition to the facilities went hand in hand with success in securing additional freight business, and the success in securing greater revenues per mile was used as a lever to secure more facilities. In 1910, when freight traffic was unusually heavy, the Pennsylvania was being operated to within ten to twenty per cent of its capacity; the New York Central probably not so near capacity, but within measurable distance of it. The Erie had a margin which neither of its trunk line competitors had. The sums which had been spent for new yards and terminals were just beginning to show some results. From then on the Erie began to make a bid for competitive business which moved by the route which could handle it most expeditiously. The Erie has very good facilities for the sale of fruit by its consignees in New York city. It made a strong bid for fruit east of Chicago and was successful in getting a large tonnage. In 1915 there was 550,000 tons of fruit and vegetables carried as compared with 371,00 tons in 1909. The Erie also made a successful effort to increase its tonnage of dressed meats. The tonnage of dressed meats in 1915 was 342,000, comparing with 126,000 in 1909. The percentage of anthracite coal tonnage to total tonnage in 1915 was 23.61, comparing with 28.45 in 1909, and of bituminous coal, 17.77, comparing with 18.16 in 1909. The Erie, charging the same freight rates as its competitors, went after the business by means of offering more expeditious service. The accompanying table shows the car mileage on each division in 1913, 1914 and up to October, 1915. This tells a story of how the improved facilities were used to get business that it would be hard to tell in any other way as concisely.

One very important factor in the steady increase in car mileage per day for the system from 25.20 miles in January, 1913, to 33.27 miles in September, 1915, was the policy adopted in regard to switching in yards. The general plan for improvement had provided liberal expenditures for yards and terminals, as will be seen from the figures given for each division. Ample yard tracks, however, and not always mean clean yards. Even a vigorous campaign of supervision and of stirring up interest in the question of car movement is not always successful. The Erie management combined with a vigorous campaign direct from headquarters to improve car movement, a willingness to put on additional switch engines in yards where it was necessary to clean these yards up. The vice-president and general manager personally made a study of this question of getting cars through the yards and spent a great deal of time in the latter part of 1914 and early part of 1915 in personally studying at first hand the situation at points of congestion on the line. The result was that in September, before the present freight congestion at the eastern seaboard had become acute, you could travel from one end of the Erie to the other, and see yards, almost without exception, empty except for bad order cars or a train which had just come in or was waiting to have the road locomotive hooked on.

As an instance of the aggressive traffic policy which the Erie has pursued in recent years, the abrogation in 1911 of the old agreement of 1877 may be mentioned. In 1877, when the Erie and the Lake Shore & Michigan Southern were building south from the Lakes into Pittsburgh territory, and the Pittsburgh & Lake Erie was building north from Pittsburgh toward the Lakes, an agreement was made whereby an east and west line was drawn about 70 miles north of Pittsburgh across the entire country, and the business of the country from and to the Pittsburgh territory was partitioned between the Erie and the Lake Shore. After the passage of the Mann-Elkins amendment shippers could specify the routing of their freight and the old agreement therefore could not be enforced, and in 1911 a new agreement was made by which the restrictions as to New York Central competing for traffic south of this line and Erie competing for business north of this line were entirely removed. Since 1911 the Erie competes in Pittsburgh with the New York Central for traffic for Chicago and the New York Central competes with the Erie for traffic for the territory southwest of Pittsburgh. Another instance might be mentioned of a quite different sort. The New York division of the Erie runs through a rich dairying country. The Erie has encouraged in every way the dairying business of this territory and in 1915 was handling 80 cars of milk a day into New York.

Conclusion

In 1915 the Erie earned 4 per cent on both its first preferred and second preferred, and a little over 4 per cent on its outstanding common stock. Its total outstanding interest-bearing securities, including equipment trusts and notes, was at the rate of a little less than $110,000 per mile. While, of course, the cost of a double-track trunk line, such as the Erie now is, is not comparable to the four-track Pennsylvania or New York Central, it is fair to point out that the par value of the interest-bearing securities of the Baltimore & Ohio are at the rate of over $90,000 per mile; and while the Baltimore & Ohio has a large investment in the securities of other companies which makes an accurate comparison impossible, the generalized comparison indicates that $110,000 funded debt for a double-track trunk line, with low grades, stone ballast, 90-lb. rail and modern heavy locomotives, is not an excessive figure. The $37,000,000 which the Erie has spent since 1902, against which not a dollar of obligation has been issued, has put an actual margin of value in the property over and above its funded indebtedness, so that Erie stock today has a value represented by an equity in the physical assets and earning power of the railroad which, while by no means equal to the face value of the stock certificates outstanding, is equal to a percentage which may be roughly figured at from 30 to 40.

Further Electrification of Swedish Railways.—For the purpose of introducing electric traction on the East Central Railway, it is proposed to exploit the power of the Svarten at Mjölarp. The question has been under consideration for some years, and a concession was granted, but the holder of the concession failed to comply with its conditions. The matter has now been taken up again and a guarantee given to have the hydro-electric power station ready in 1920. The electrification of the Lund-Bjärred Railway is proceeding, although the state telegraphs have retarded work in connection with the removal of telephone lines.

A NEW BRIDGE FOR THE BESSEMER & LAKE ERIE

The Bessemer & Lake Erie is renewing its high single-track bridge over the Allegheny river at Black Run with a new double-track structure on the same site. The existing piers will be lengthened to accommodate the wider spacing of the new trusses, and to allow the use of an ingenious erection plan which will permit the construction of the new superstructure without interfering with the traffic on the old bridge. A long viaduct approach on the north end of the bridge will be filled to form a double-track embankment involving 1,200,000 cu. yd. of material.

The track level at the south end of the old bridge is 164 ft. above low water in the river, and the grade across the bridge is 0.48 per cent descending northward. Commencing at the south end, the present structure consists of five deck truss spans, including, respectively, one 207 ft., one 520 ft., and three approximately 350 ft. long each, measured from center to center of piers. North of these spans is a steel viaduct 1,737 ft. long. The 520-ft. span is 83 ft. 8 in. clear above full pool level of the river, and the three 350-ft. spans are 93 ft. 11 in. clear. The substructure consists of masonry piers extending up to the shoes of the trusses.

The track on the new bridge will be on a level grade at the same elevation as on the east end of the old bridge. The old substructure being utilized, the new spans will be the same length as the old ones with the addition of a 274-ft. and a 152-ft. deck truss span, and a 60-ft. deck girder span north of the old bridge proper, thus occupying a portion of the length of the old viaduct approach. This will necessitate two additional high piers and a south abutment. The southernmost pier will be buried in the end spill of the big embankment mentioned above, and the abutment will be of the pocket type, set in the top of the fill.

To reduce falsework to a minimum, most of the erection of the new spans will be carried on by the cantilever method. To facilitate this, the six longest spans in the new bridge will be arranged in two groups of continuous trusses, embracing three spans each. This will give a length of 1,139 ft. for the continuous truss of the three spans at the south side, and 969 ft. for the truss embracing the next three spans. All of the spans, including the independent 152-ft. span, will be spaced 31 ft. center to center of trusses.

As shown in the accompanying elevation of the new bridge, the erection of the 272-ft. span at the south end of the bridge, and of the 274-ft. span near the north end, will be accomplished on falsework. With the 274-ft. span in place, erection will proceed southward continuously by the cantilever method until the three 350-ft. spans have been completed, using temporary bents in the center of each span as indicated. The 520-ft. span will be erected by cantilevering from the adjoining spans on each end.

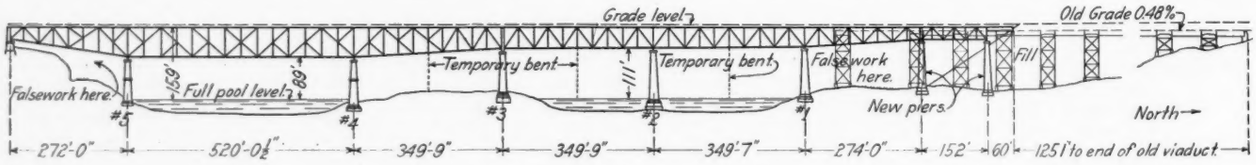
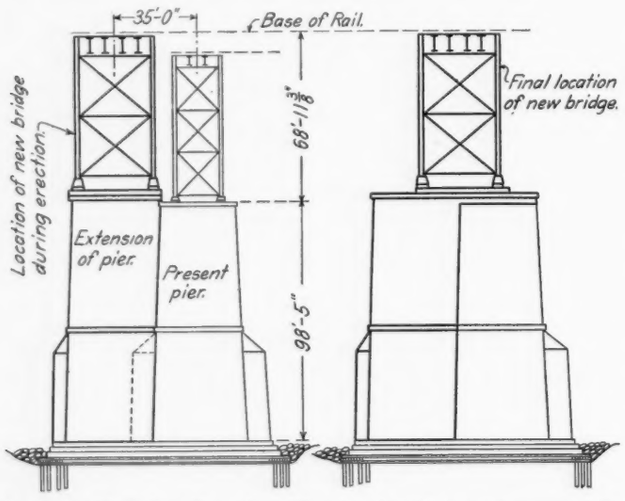


Diagram of the New Bridge



Sections Showing Erection Plan to Avoid Interference with Traffic

Interference with the old bridge is to be avoided as shown in the cross-section. The old piers will be extended on the downstream end a sufficient distance to permit the erection of the new superstructure clear of the old one. The foundations of the river piers 1, 2, 4 and 5 were made long enough at the time the bridge was built to carry the required extensions of these piers. As soon as the new spans are in place and the stage of the work on the embankment permits, traffic will be turned over the inside track on the new spans, and the old ones will be dismantled. The old masonry will then be brought to the level of the new, and the new spans will be shifted sidewise to a central position on the piers.

The new structure is to be designed for Cooper's E-75 loading, American Railway Engineering Association specifications, with special provision in the unit stresses for the use of silicon steel compression members, and special carbon steel eye-bars.

One of the most interesting features of the project will be the means adopted for the construction of the embankment which will replace the old viaduct. The existing viaduct approach can not be used for unloading filling material because of the heavy traffic which this single-track structure carries. Owing to the completion of some reconstruction work at Bulls creek, about ten miles from the Allegheny river on the Bessemer & Lake Erie, a 1,400-ft. steel viaduct has been released and is now being dismantled. This consists of 40-ft. towers and 80-ft. girder spans and is 135 ft. high at the center. It is proposed to re-erect this steel viaduct alongside the bridge approach, and use it for unloading the filling. It has been found that this will cost less than the timber trestles it would be necessary to construct for the same purpose. As the embankment will be over 100 ft. high, its construction by means of timber trestles would necessitate three lifts, whereas the embankment may be made in one lift with the use of the steel trestle.

The design and construction of this bridge are under the direction of H. T. Porter, chief engineer of the Bessemer & Lake Erie. The American Bridge Company has the contract for the fabrication of the structural steel work which amounts approximately to 10,000 tons.

PETROGRAD-KOLA RAILWAY.—Official announcement has been made that the Petrograd-Kola Railway will be finished by the end of the year, thus providing Russia with communication to the ice-free port of Alexandrovsk.

The Sanitation of Railway Passenger Cars*

Considers the Transportation of Infected Persons; Examination of Dining Car Employees; Fumigation, etc.

By Thomas R. Crowder
Director of Department of Sanitation and Surgery, Pullman Company.

It is only during the last 10 or 15 years that attention has been directed to railway sanitary problems. In its main character the railway car is a temporary habitation, not differing in other essentials than its mobility from other places where people live together in close proximity. The same sanitary practices are necessary as for any other house, with the exception that sewage cannot be similarly disposed of. Failure to realize this has led to many unnecessary laws and regulations, some of which have no relation whatever to the public health, and in which the major and minor questions at issue have often been so confused as to act as a real obstruction to sanitary progress.

It is the aim of sanitation to prevent the spread of infectious diseases. These diseases are caused, with few exceptions, by microscopic vegetable parasites growing in the bodies of affected persons; the organisms are contained in and thrown off with the body secretions and excretions, and are transmitted from person to person only by the transfer of the causative organism. There must always be a mechanical transfer of a material substance containing disease germs before infection can take place. It does not need to pass directly, the route may be devious; but whether direct or devious, the source is invariably a previous infection. It logically follows that the fundamental necessity in preventing the spread of infectious diseases is to prevent the promiscuous distribution of the secretions and excretions of infected human beings. Infection in occupied places may be contracted in three ways: by direct transmission from person to person through the agency of mouth-spray and intimate personal contact; by the common use of utensils or other facilities for comfort and convenience; and from infected premises. It is obvious that the first necessity in protecting those who travel is to keep out of cars those known to be infected with communicable diseases. Under their legal obligation to furnish transportation, railroads have little power to discriminate among those who apply for service. It is not possible to refuse transportation except under certain well defined conditions, which, in so far as the communicable diseases are concerned, must include a definite diagnosis, and this the railroads are not, and cannot be from the nature of the case prepared to make. The proper remedy would seem to be in legislation placing the responsibility on the passengers themselves, and making it illegal for those afflicted with communicable diseases to ask for or to accept transportation from common carriers. Such laws are now in existence in one form or another, mostly as rules of the state boards of health, in some 28 states; and they have done some good, although there has been little attempt to enforce them or to make them generally known.

There has been issued by the Federal government a revision of the interstate quarantine regulations which denies absolutely to all persons having the more dangerous and readily transmissible infections the right to enter public conveyances, and on all those with transmissible diseases which are less readily transferred, puts such restrictions as will render them without danger to other travelers. The regulations are so designed as to protect the railways in their refusal to transport people with transmissible diseases and to place upon the traveler the responsibility of declaring his condition. This is as it should be; in the nature of things the infected person is the one most likely to be informed. In the end, if the laws can be made a part of common knowledge, vastly more good may come through directing people's thought to the means of their own protection and to their public responsibility. It must be confessed that few take proper precautions now.

Regulations contribute to our protection only to the extent that they prevent the dangerously infected from traveling. But unfortunately the dangerous person cannot always be identified. One may be infected with the virulent germs of a disease and yet not be sick of it, or his illness may be no more than a slight indisposition, the real nature of which he does not even suspect. Many people are so afflicted. A mild sore throat may be diphtheria; a trifling rash may be small pox, measles, or scarlet fever; a little cough which scarcely discommodes the patient may throw myriads of tubercle bacilli into the surrounding air. Even typhoid fever, generally a serious and prolonged disease, does not always bring its victim to his bed. There are people who for months or years after recovery harbor the bacteria of an infection from which they have previously suffered and who remain entirely well while they constantly spread their virulent germs about them. From these mild cases, and from the infected well who are known as "carriers," severe cases may be acquired by those who are more susceptible.

Regulations segregating the known cases of infectious diseases from cars are only a partial protection to the uninfected and some chances must always be taken. Until each passenger has grasped, and has applied for his own and his fellows' protection, the idea of non-promiscuity, there can be little improvement in this feature of public assemblage. The good is to be wrought through more careful personal habits. Each one should learn to keep his own secretions to himself, to be scrupulous in his personal cleanliness—and each to avoid the secretions of others. All should learn to avoid promiscuous personal contact. And he who knows himself to be a source of danger should be doubly careful.

One of the most serious and widespread communicable diseases to which travelers are exposed is pulmonary tuberculosis. It may be contracted in various ways, but beyond doubt direct transmission through the medium of mouth-spray is one of the most frequent and important. Although its prevalence and destructiveness are appalling, public sentiment will not approve of limiting greatly the movements of its victims. I believe it would be a valuable public health measure to restrict the freedoom of the tuberculous. But their number is so great, their disease is so chronic in its course and leaves them so long in comparative health and comfort, that segregation is entirely impractical. The disease is an infection which is slowly acquired by intimate contact and by long exposure, and the time of exposure in railway cars is neither long nor necessarily close. Careful habits in disposing of mouth secretions and in protecting the air from mouth-spray, can so nearly overcome the danger that it practically disappears. The new interstate quarantine code recognizes this. It permits the tuberculous to travel, but it prescribes that they must be provided with and must use the means of preventing contamination of their surroundings.

*Abstract of a paper read before the New York Railroad Club, April 21, 1916.

The railway can improve its sanitary efficiency and aid in protecting its patrons by enforcing the regulation. Further than this the railroad has two duties: to furnish healthy crews for trains and to prevent overcrowding.

It is often proposed that special cars should be furnished for the diseased, especially for the tuberculous. Leaving aside the serious economic difficulty, it would be impossible to get more than a small proportion of tuberculous patients into such special cars. Far more important is the patient, either unsuspected or showing no conclusive evidence of his disease, who insists on traveling as a healthy individual. So the question becomes not so much one of who shall use the car as of the habits of those who use it.

The accumulating evidence of recent years has made it more and more clear that by far the majority of transmissible infections are passed directly from person to person. In preventing direct transmission, the railroad has done its fair part and has discharged its duty well when it has done what it is able to keep communicable diseases out of its cars. But what may it do to prevent the indirect transmission of disease by reason of the common use of facilities for comfort and convenience?

It is largely in the power of railway passengers to annul, on the one hand, the dangers incident to their own intermingling, and on the other, whatever measures the railroad may take for their protection. It is nevertheless right that railroads should be required to provide facilities whereby its passengers may carry out to the utmost their own protection.

One of the things through which disease is most readily transmitted by the indirect route is the common drinking cup. Infected lips leave bacteria on the rim, and well lips pick them up. Ten years ago the common cup was universal on railway trains; now it is a thing of the past. Thanks to the initial temerity of Kansas in 1907, a reform was started which has now become complete. The common towel was another very great evil. It has gone the way of the cup. The comb and brush, while less important, should be induced to make a similar exit.

Ample provision should be made in all railway cars for travelers to wash their hands and faces. Lavatories should be conveniently located, supplied with an abundance of water, well drained and trapped, and should have smooth surfaces for easy cleaning. Towels should be constantly at hand and in sufficient quantity for individual use. There should be a place for brushing the teeth—a dental lavatory—in all cars which make long journeys. Using a wash basin for this purpose is to make a cuspidor of it.

Toilets should be always available, well flushed, perfectly emptying, and capable of easy cleaning. The old type of open hopper, with its up-draught of wind and dust and its nearly constant fouling, is disagreeable, and its use is avoided to the detriment of the health of passengers. Cuspidors should be provided that spitting may not become an insanitary nuisance. The disinfection of toilets and cuspidors is largely aesthetic, though it is often insisted upon by laws and regulations. What goes into them is well disposed of; it is not touched, cannot fly into the air, and does no harm unless it becomes a nuisance to sight or smell, when immediate remedies are demanded. The fallacious drip-machine —the so-called continuous disinfector—should be mentioned only to be condemned. It does not disinfect; it only distils an odor, sometimes worse than the one it tries to hide, and diverts attention from conditions that need mending.

Day coaches should have cans for garbage and refuse. Not that garbage and refuse carry infectious diseases—that is one of the fallacies of popular thought—but particles of food and other rubbish may be picked up from a dirty floor by children, or taken from a cuspidor in the mouth of which it lodges. An ample supply of pure and wholesome drinking water should be supplied and stored in such a way that it cannot readily be contaminated by passengers. Ice that goes into the water should be pure and should not be handled with bare hands. Better yet, ice should not go into the water at all, but into a separate compartment of the cooler. Such an arrangement is standard on many railroads and in the Pullman service.

In any discussion of railway sanitation the dining car deserves a thorough consideration; it can only be touched upon here. Cleanliness in the preparation and handling of food is all important to the health of travelers. But more important is the personal cleanliness of dining car employees and the supervision of their health. Periodic examinations of cooks and waiters should be made at frequent intervals, certainly not longer than quarterly or half-yearly, and those found infected with tuberculosis, venereal diseases, typhoid fever, diphtheria, etc., should be dismissed until complete recovery has taken place. Especially the typhoid "carrier" is a very dangerous person in the kitchen. Numerous small epidemics of the disease have had such a starting place, the infection being carried to food in course of preparation by hands unwashed after use of the toilet. Every dining car should have a lavatory for the crew, and the most rigid supervision should be instituted to see that it is always patronized and that the nails are properly manicured before beginning service. Some railroads now provide for this examination and supervision. It is only a question of time when all will be compelled to do so, and perhaps also to inoculate their dining car crews against typhoid. There has occasionally been severe criticism of those railroads which allow their crews to sleep in dining cars. The practice is undesirable from an operating standpoint; but under some conditions it is almost unavoidable, and I cannot see that it does any harm from the hygienic standpoint.

The finger bowl has been much maligned. The harm it does is problematic; I believe it is insignificant and practically negligible. But the care of drinking glasses and eating utensils is of great importance. They should pass through boiling water between users.

When we come to consider hangings, linen and bedding, floors, carpets and upholstery, and their possible relation to the health of travelers, we are brought to a discussion of the third method of infection in railway travel, namely, the possibility of the car itself being infected in such a way as to transmit infection to its occupants.

Though we must expect most cars to contain pathogenic micro-organisms in greater or lesser numbers, their presence is no proof of a dangerous degree of infection. In order to acquire an infectious disease we must receive organisms in sufficient quantity and of a sufficient degree of virulence. Much evidence has been accumulated in recent years which goes to show that the places which have been vacated by the sick are without danger to the well unless very gross contamination is present and no adequate precautions are taken to remove it.

It is of course desirable that the railroads should take precautions to keep infection down to a minimum. This may be done in two ways: by mechanical cleaning which removes the bacteria, and by fumigation which kills them. Of the two methods, the former is much the more important. Mechanical cleaning will not remove all the bacteria—for it cannot remove the last particle of dust and dirt in which the bacteria are contained—but if it is well done not enough will remain to transmit disease or to hold out any danger to passengers who use the car. The method used in the cleaning of cars is of less importance than the result obtained, which must be reasonable cleanliness in all instances. For bare floors, toilets, woodwork and utensils, soap, water, and elbow-grease are the important ingredients which must enter into the process. For dislodging dust from corners and angles an air blast is both rapid and efficient. For removing it from carpets and fabrics the vacuum process is best; it not

only removes the dust but collects it for final and quick disposal instead of scattering it about. But vacuum cleaning without sufficient power is a make-shift. Some two years ago, as a member of a committee to investigate car cleaning, I went through this subject in an experimental way. In the beginning there was no vacuum machine on the market which was well adapted to the work in car cleaning yards, but one was soon developed which did better cleaning than the compressed air process and did it cheaper, as has been verified by two years of practical application in Pullman service.

Fumigation is a procedure which has been much overworked in the past. Ten years ago there was an epidemic of state board of health regulations requiring it at frequent periodic intervals. If properly carried out, there is no doubt that fumigation will kill the vast majority of the bacteria in a car, but it is not a proper substitute for thorough mechanical cleaning, after which not enough bacteria will remain to be of any real hygienic significance. The movement for periodic fumigation is now dying out; the tendency is rather to require it only after serious infectious diseases are known to have been carried, as is done by the new interstate quarantine code. No objection should be made to that demand, even though the good it does is questionable and problematic; and the roads should adopt the plan as a part of their own regulations.

In addition to providing for the sanitary arrangements outlined above, the roads have another duty; to instruct their employees in the principles that govern the protection of public health, to make rules for their sanitary guidance, and to see that these are obeyed. Some two years ago I prepared a little pamphlet on sanitary regulations for the instruction of Pullman employees in which I attempted to show the reason for the existence of certain rules with which they must comply, in the belief that better compliance will be obtained when the reason is understood. Perhaps only a minority of employees are really influenced in this way, but undoubtedly many have profited and some good has been accomplished, and the pamphlet has now been incorporated into the book of rules of the company.

In the planning of car seats too much attention has been given to the reversing machinery and too little to the shape. The seat should be so shaped as to conform to the curve of the back, which it usually is not; it should be at the proper distance from the floor—many are now too high; it should extend high enough to support the head; and a foot-rest in front adds greatly to the comfort.

Ventilation is a vital sanitary problem. Good air is of prime importance to good health. Ten or twelve years ago, attempts to supply good air to railway cars were generally failures. The problem still has its difficult points, but it is now much simplified. Good air is air that bears a proper thermic relation to the body. It must be able to absorb the body heat as rapidly as formed, without being cold enough to produce chilling. It must be warm, but not too warm; it must have motion, but not enough to cause discomfort; it must be changed constantly to prevent stagnation and overheating. The chemical changes brought about by respiration are ordinarily negligible. A more difficult problem than maintaining the air supply is the proper control of heat. If the temperature is carefully regulated to between 65 and 70 deg. F., complaint of poor ventilation will rarely arise, even with impure air and a very small supply. Above 70 deg. trouble comes quickly; we think there is not enough air to keep our lungs flushed out. That is not the trouble at all, for let the air supply remain the same and the temperature drop to the lower sixties and we think there is too much. The income and the outgo create air motion within. When the temperature is high we need more motion, hence a larger air supply, to keep the body cool; when the temperature is low we need less motion, or a lower air suply, to keep the body warm. But the lungs and the functions of respiration have nothing to do with this; it is entirely a surface function.

A certain amount of dust, smoke and engine gases inevitably enter cars. They are, of course, liable to great variation. Smoke and gases are never troublesome except in passing tunnels, when they produce no more than temporary discomfort. I have examined many speciments of tunnel air and have found the gases of combustion always far below the point of danger. Ordinary dust is of more importance because it is more prevalent and because it is possibly infectious. If not infectious it is at least irritating and uncomfortable, and prolonged breathing of a heavily dust-laden air predisposes to infections of the respiratory tract. Its sources from within the car should be limited by good cleaning, which is now generally satisfactory. When this is well done, carpets and plush are better than bare floors and smooth upholstery because they hold the dust that settles on them and prevent its redistribution to the air of the car.

The chief source of dust, and the only one of any real importance, is the roadbed, which brings us to the one feature of the sanitation of railway cars which is entirely distinctive —which is strictly a railway problem—which is unique from the very fact that the car is a mobile house. I refer to the disposal of sewage and to the subject of track pollution by human excretions. The problem of sewage disposal does not take on the same form in any other place, and certainly the method of solution on the railway cannot be the same as that which is ordinarily applied to fixed habitations. Sewage must either be dropped on the surface of the tracks or it must be received into some portable container.

As yet we do not know the hygienic significance of track pollution. It should be studied with care. Two things may conceivably bring danger; either discharges may be washed from the tracks into streams or bodies of water which are used for domestic supply, or they may dry, become pulverized, be blown up as dust by winds or passing trains, scattered to the neighborhood or blown into passing cars. Our knowledge is now sufficient to say without reserve that the first of these dangers is real, and that where track drainage is into domestic reservoirs their protection is demanded. How great may be the danger of infection from road-bed dust we do not know, but it is not unreasonable to conclude, from already well known facts, that pathogenic organisms dropped upon railway tracks are rendered harmless before they become particles of dust—not by the process of drying alone, but because under the conditions of drying it is almost essential that they be submitted to prolonged exposure to light, and prolonged exposure to light destroys disease-producing germs. Furthermore, and in spite of the many hysterical statements about it, a very small part of railway track dust is made up of human excretions. And I fancy it may be quite right to conclude that where water supplies are not concerned track pollution is of little or no importance.

Discussion.—Dr. W. C. Rucker, assistant surgeon general of the United States Public Health Service, confirmed the statements of Dr. Crowder, saying further that periodic fumigation was of very doubtful value. It was either a case of "burning incense to an unknown god or of creating a smell to drive out devils." Dr. Rucker also took up the question of track pollution and said that the investigations of his department had failed to show that there was any danger therefrom except in very rare cases where there was possibility of direct pollution of water supply. Dr. D. H. M. Gillespie, of the New York Central, told something of the work that had been done on the New York Central, touching particularly upon the periodic examination of dining car employees, etc. Dr. E. V. Milholland, assistant to the chief medical examiner of the Baltimore & Ohio, spoke of conditions in foreign countries, saying that his travels in Europe and other countries had convinced him that the United States was much ahead of other countries in the matter of sanitation on railway cars, in railway stations and similar places.

CONFLICTING RAILROAD REGULATION*

By Chas. J. Graham

President American Hardware Manufacturers' Association

Speaking in Birmingham at a joint convention of the American Hardware Manufacturers' Association and the Southern Hardware Jobbers I can hardly omit reference to a great business question which seems to be giving southern as well as northern business men anxious thought—the question of railway regulation.

A leading advocate of correction for existing defects in regulation is an Alabama statesman, Oscar W. Underwood. That eminent exponent of southern policy, of whom the whole country is proud, began his career in the Senate by announcing that he regarded the railway question as the most important now remaining for solution. What is needed, he declared, is that Congress shall confide to Federal authorities the regulation that is now attempted by 48 states and the nation besides.

This declaration was the occasion of considerable surprise among a number of the senator's acquaintances, and they inquired of him what the business men of Alabama would think of such a proposition. By way of reply, Senator Underwood advocated federal regulation before audiences of Alabama business men who enthusiastically applauded the sentiment. He was then questioned as to the farmers' attitude regarding it, so he made a similar experiment with the same result. So this would indicate that he has the backing of the entire state in his efforts in this line, and if such is the case, why should he not have the backing of the entire south if it were placed before the people in the proper manner?

Still more remarkable is something that is going on in the House of Representatives. A committee has lately reported out a bill, which in fact passed the last House, but was lost in the distractions of war—a bill that would forbid any railway engaged in interstate commerce to issue stocks or bonds without sanction of the Interstate Commerce Commission. Think of what that means! If the federal authority gave its permission and some state forbade an issue of securities, the action of the state would be void, because where Congress acts it is supreme. If Congress can unify the regulation of stock and bond issues it can find more power where that came from and regulate every phase of the business of any railroad which performs interstate commerce. This would mean that such controversies as have occurred between states—for example, Texas and Louisiana—would never happen again. It was Louisiana that complained against Texas and Texas that seemed to cling to state action. But who originated the House bill for federal regulation of securities? A Texas congressman, Representative Rayburn.

A similar tendency of sentiment toward support of the movement for federal jurisdiction is reflected in the trade press and daily papers of several southern states. There seem to be two reasons for this sentiment.

First—the south needs more railroads and better railroads, and it has come to be questioned by some of those who have advocated state action whether or not more and better roads can be obtained in this way. The president of the Texas Farmers' Union, Henry N. Hope, called attention to the fact that, while Texas has only six per cent of the total railroad mileage of the country, it has 25 per cent of the mileage which is in the hands of receivers. This makes it a business question as well as an agricultural question. The great future, which all will foresee and rejoice to foresee for the south, is a future based largely upon proper transportation development. There are no substitutes. There is nothing which can be offered which is just as good. Proper railroad development is almost entirely dependent upon wise governmental action; and, while we all admit that the railroads must be controlled, at the same time we should agree that they must be encouraged and fostered also. It is beginning to be realized that the most important state right of all is that the people of each state have a right to protection against the authorities of other states; and it is a perfectly logical proposition that no state should have the right to legislate, favoring herself, to the detriment of her neighbor; and to maintain this our forefathers ordained that Florida's population of three-quarters of a million has an equal voice in the Senate with Pennsylvania's seven and three-quarters millions, and Alabama's 118,000 voters have two senators, the same as New York's million and a half voters.

Second—there is no greater single factor in national defense than our railroads, and the question of national defense is the big one before us today. It is of paramount importance to the South, as well as to the North, as ten southern states are exposed to foreign attack by water. The railways which connect and serve our coast fortifications should be double-tracked and provided with facilities for prompt and effective movement of munitions and men. One state pulling against another in the regulation of our carriers would cause blundering and delay. The people of no southern state, the people of no state in any part of the Union, will tolerate such a situation for a moment, once they understand it.

To many the centralization of power is novel; to some it appears dangerous. Complete conversion to it may take time. The significant fact is that sentiment here in the very seat of the state's rights tradition is facing the facts. Men see that our railways have ceased developing either in quantity or in quality. They know that the result is full of peril both to our industrial and agricultural development, and to our national security. It is not reasonable to suppose that men engaged in either business or agricultural pursuits in any section of the Union would stand in the way of a proposition which means the full development of our natural resources, the growth and increased importance of every city and state traversed by prosperous railroads, and the putting upon a firm foundation the factor of first importance in our national defense—which can only be brought about by regulation conceived and administered for our national well-being.

Resolution Adopted on the Day Following Mr. Graham's Speech.

The American Hardware Manufacturers' Association unanimously adopted the following resolutions: This association looks with disfavor upon conflicting regulations by numerous differing commissions, and urges upon our lawmakers the passage of such legislation as will strengthen and extend the powers of the national commission, thereby obviating such conflicts and by this means assisting and encouraging the commerce of our country.

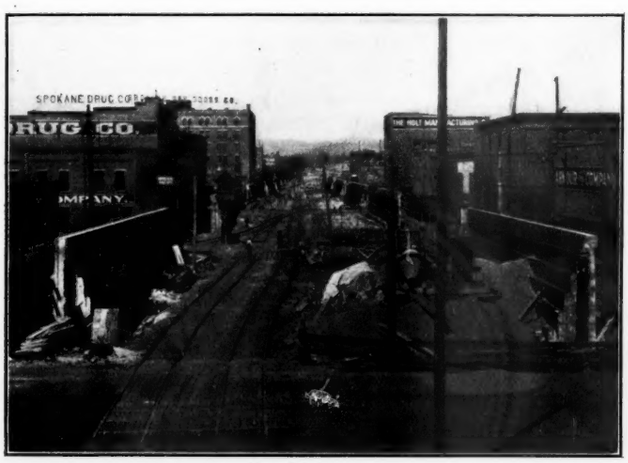
*From an address delivered at the opening meeting of the American Hardware Manufacturers Association at Birmingham, Ala.

Substitutes for Copper and Brass on Austrian Locomotives.—The railroads of Austria have been severely put to it to adapt other materials for uses in which copper and brass were formerly employed. The very large demand from munition and ordnance manufacturers has caused a severe scarcity in materials containing copper. German locomotive builders before the war employed copper and its alloys up to about 4.1 per cent of the weight of each locomotive. Now ingot iron is replacing these metals for firebox sheets and staybolts. The Prussian-Hessian state railroads are said to have employed as much as 500,000 soft ingot iron staybolts satisfactorily. Brass branch and oil pipes have been replaced by seamless drawn iron pipes and by either seamless or welded gas tubing.

Extensive Grade Separation at Spokane, Wash.

The Northern Pacific Is Raising Its Tracks and Terminals to Eliminate Numerous Street Crossings

The elimination of the grade crossings on the Northern Pacific through Spokane, Wash., presents many points of interest. The original construction through the city was made in 1883, when Spokane Falls was a village of 800 inhabitants. At that time, the center of the city was about

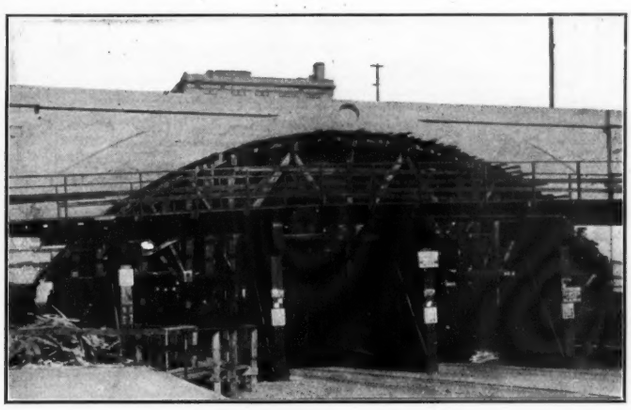


Retaining Walls Completed West of Howard Street

four blocks from the track, and the land was covered with timber and cut transversely with one or two unimproved road crossings.

The growth of the city since 1883, and especially in the last two decades, has been very rapid. The Northern Pacific is now within three blocks of the center of a city of 105,000 population, with 30 street crossings within the city limits. Its right-of-way was originally defined as a strip of ground 400 ft. wide, but it has been encroached upon and reduced from time to time. West of the passenger station between Washington and Cedar streets the present right-of-way is 225 ft. wide, 113 ft. of this width being used for railroad purposes, and the remainder being leased for warehouse sites, thus creating a district in the heart of the city which requires frequent switching across streets. Between Washington and Division streets, the passenger yard with an open crossing at Browne street, gives additional interference with street traffic.

East of Division street are located the terminal freight yard and freighthouse tracks, the Division street and Sprague avenue intersection crossing the switching lead to all tracks in the freight yard. At this point about 240 engine and train movements in rush times conflict with some 250 street railway crossings every 24 hours. In order to eliminate this dangerous crossing by raising the railway tracks, it was found necessary to raise all the tracks in the passenger yard, and either close one or more of the streets west of it, or continue the elevated structure beyond the improved part of the city. During the last 15 years various plans for grade separation had been presented from time to time on the

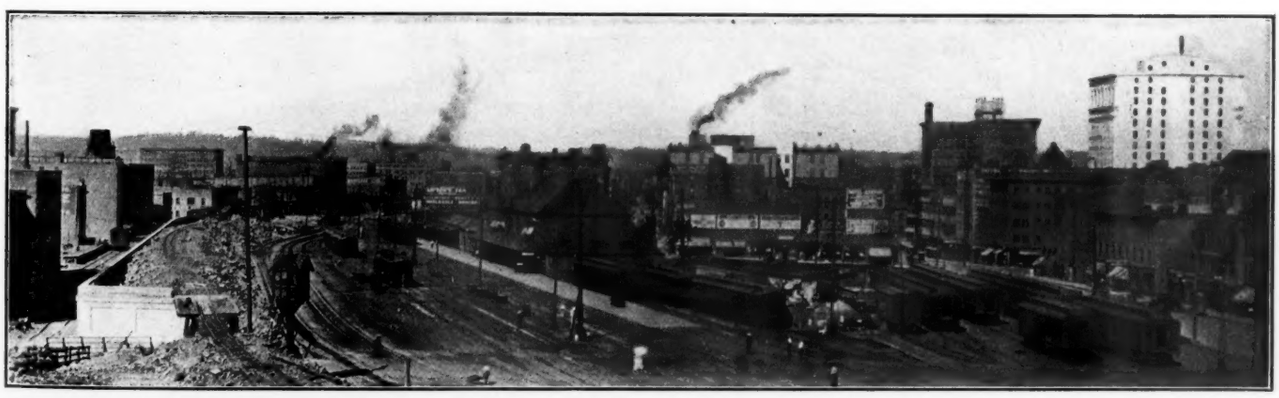


The Washington Street Arch. Track at Intermediate Grade in the Foreground

solicitation of the city. Three years ago, the present plan was taken up and finally covered by an ordinance.

This ordinance requires the railway to elevate its tracks in the business district and to provide suitable bridges over each street for a distance of two miles. It requires privately owned public utility companies to make such utilities conform to any changes made in the streets at their own expense. All other cost of the work including damages to property abutting on changed street grades and the expense of re-adjusting or re-building municipally owned public utilities are to be borne entirely by the railway.

In addition to the work required to carry out the grade separation scheme, the city provided in the ordinance for the improvement of the grades of a number of the cross



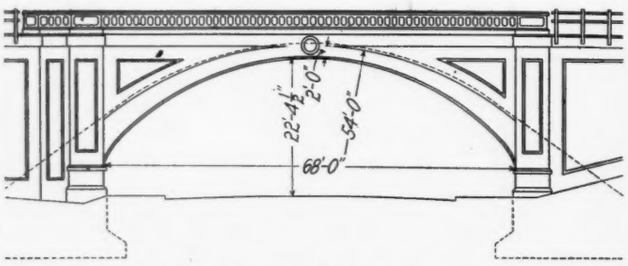
The Passenger Station, Showing Progress of the Track Elevation Work

streets and for an enlarged sewer system in Sprague avenue and as these improvements were in no way necessitated by the grade separation work, the city has contributed funds to pay a small proportion of their expense.

Construction Extends Over 4½ Miles

In general the plan provides for raising the tracks over all streets between Division street and Sixth avenue with run-offs at either end extending to Erie street on the east and the Hangman creek bridge on the west. The total length of line disturbed is 4½ miles; the average raise is 16 ft. The elevation proper is a six-track system with a four-track approach from the east, a two-track approach from the west and with a passenger station yard of 8 to 11 tracks.

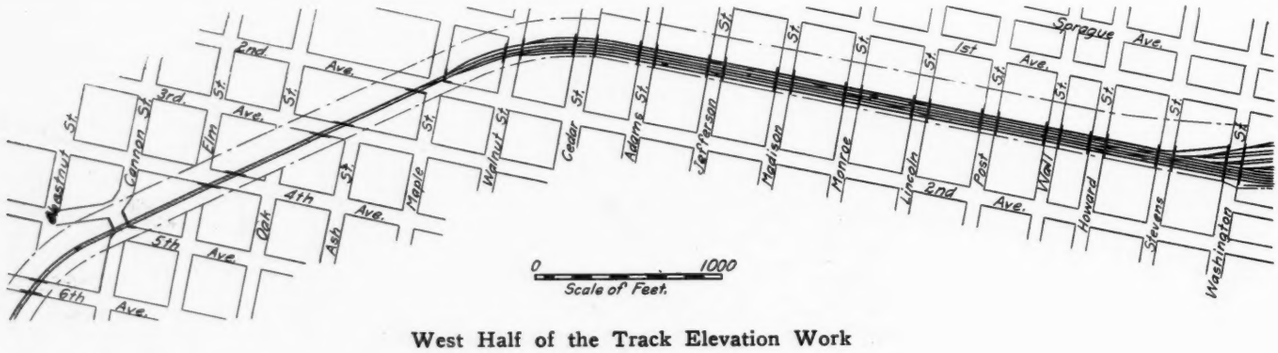
Between Division and Walnut streets, the tracks will be supported upon a fill enclosed by retaining walls and carried over the intersecting streets on steel and concrete bridges; the rest of the elvation is on a fill with steel bridges supported on concrete abutments at street crossings. The present plan does not include any radical change in the depot proper, but provides space for a new station, if future conditions should require it. The distance between tracks in front of the depot is 30 ft. for the platform spaces and 13 ft. in the remaining spaces. A subway will be provided under the tracks to connect the station with each platform by means of stairways or inclines. Separate elevators outside the elevated structure are provided for baggage, express and mail.



Elevation of the Washington Street Arch

The grade line has been established with the idea of making the most favorable grades for both the streets and the railway. To accomplish this it is necessary to depress several streets heavily to secure the desired clearance.

First Avenue Excavation



West Half of the Track Elevation Work

Most of the Bridges Are of Reinforced Concrete

Bridges will be of reinforced concrete if at points of restricted headroom, and at all skew crossings, where bridges entirely of steel or of a combination of steel and concrete, have been designed to reduce the floor depth and the space occupied by street supports, and to avoid complications unavoidable in concrete bridges. The floors of bridges will be flat slabs resting on three rows of concrete columns in the street and concrete abutments. Those requiring an extremely shallow floor have steel troughs over the roadway, but with facia girders and special treatment to give the appearance of a concrete bridge in elevation.

The minimum clearance for all bridges above the street grade will be 14½ ft. for streets having car lines and 12 ft. for all others. In many instances the grades as established give a clearance considerably in excess of the minimum.

The bridge at the intersection of Division street and Sprague avenue will be entirely of steel. The center line of the tracks makes an angle of 29 deg. with the center line of Sprague avenue. This crossing presents many difficulties and necessitates heavy cutting in solid basalt rock. The maximum cut on Sprague avenue is 11 ft., and this necessitates material cuts in Pine street and also in First avenue. The abutting property will be cut down to the new street grades by the railway or the property owners will be reimbursed for the estimated cost of making the cut.

The Browne street bridge consists of concrete abutments and concrete bents with flat slabs over the sidewalk, and a steel trough floor over the roadway. The street is cut 4 ft. in solid rock, to provide proper clearance. The ultimate width of this bridge will be 300 ft., providing room for 15 tracks. The tracks are now carried over Washington street on a steel bridge but this will be removed and a 68-ft. reinforced concrete arch will be built spanning the street at the new elevation. This arch will be 180 ft. wide and will provide space for 10 tracks.

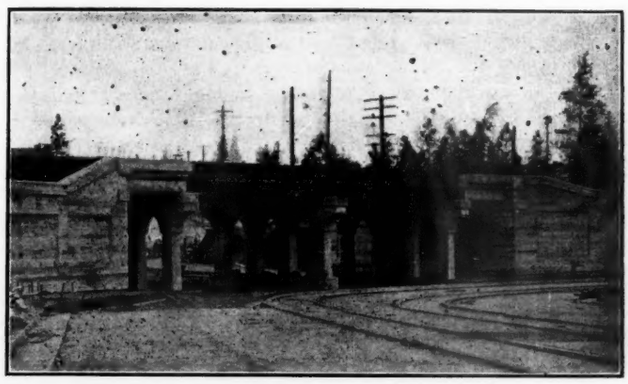
All bridges from Stevens street to Cedar street, except Howard street, will be of reinforced concrete of the flat slab type supported on three rows of arched bents with abutments

on the street line. They will be 85 ft. wide and provide room for six tracks. Howard street has a car track and to get clearance with a minimum cutting of the street, a steel trough floor will be used over the roadway.

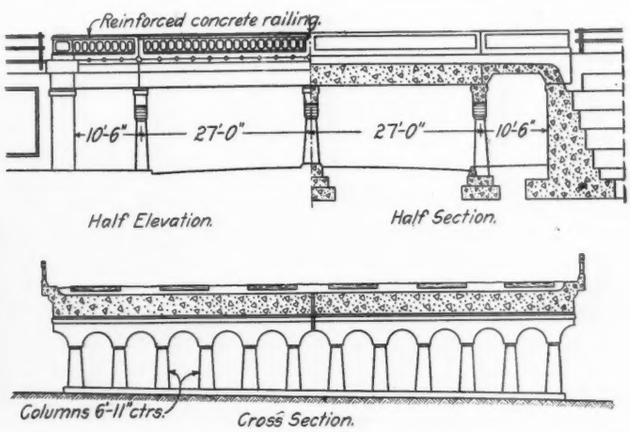
The intersection of Second avenue and Maple street is spanned by a steel bridge. To keep the street intersection clear of supports, one girder span is carried over the intersection. Because of this, and also because of the bad skew and the inconvenient arrangement of supports this structure is expensive and complicated. It carries two tracks. Steel bridges are used over Third and Fourth avenues on account of skew. The bridges over Fifth and Sixth avenues are a combination of steel and concrete, similar to the Howard street bridge, and carry two tracks.

All bridges will be waterproofed, drainage will be carried to the sewers, and the backs of retaining walls are painted with two coats of heavy asphaltum paint. Expansion joints in the walls are covered with 3-ply saturated burlap applied with hot asphalt. The approximate total quantities of the principal items involved in the work are as follows:

Embankment	450,000 cu. yd.
Concrete	75,000 cu. yd.
Structural steel	2,500 tons
Reinforcing steel	1,500 tons
Waterproofing decks of bridges	170,000 sq. ft.
Waterproofing retaining walls	380,000 sq. ft.
Solid rock excavation	80,000 cu. yd.
Common excavation	75,000 cu. yd.



Fifth Avenue Subway. Steel for Roadway Spans Not Yet in Place

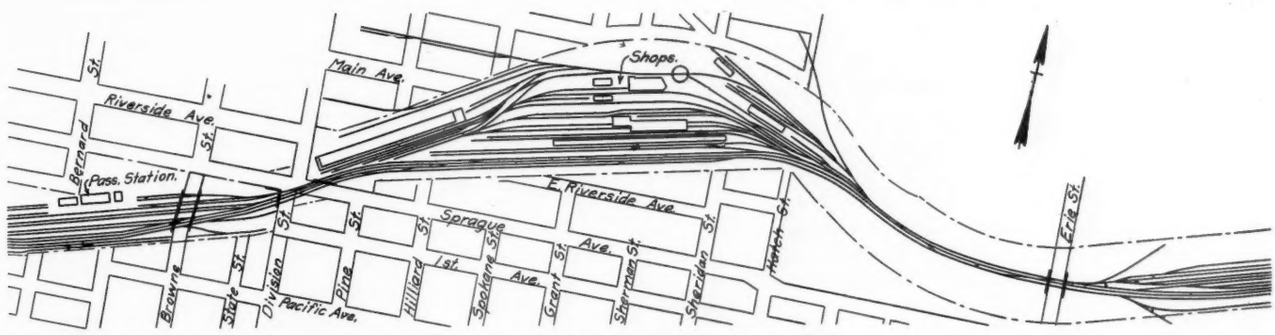


Elevation and Sections of a Typical Reinforced Concrete Subway

was one per cent uncompensated; and the new one, one per cent compensated.

Construction work was started in November, 1912, and the Hangman hill grade was raised to the new grade during the winter. A contract was let in January 6, 1913, for all concrete and street work and work on the retaining walls was started during March, 1913, but all work was closed and the contract was cancelled on May 1, of that year, on account of litigation covering the ownership of the Northern Pacific right-of-way through the city. Decisions favorable to the railway being made, another contract was let October 8, 1914, and work was resumed in March, 1915.

The schedule of work for the year 1915 included all concrete retaining walls; the bridges at Division street, Third, Fourth, Fifth and Sixth avenues; one-half of all bridges from Washington to Walnut streets; the placing of filling material for two tracks; and the excavating and repaving of part of the streets. To provide room for the construction of walls and bridges, it has been necessary to shift the main tracks from Hatch street to Sixth avenue, with the exception of the passenger yard. At present, the distance between lease lines in the warehouse district is 125 ft.; this provides space for one warehouse track south of the retaining wall, and two tracks north of the wall. The two main tracks are between the retaining walls and south of the center line. A filling trestle is being constructed the entire length of the grade change, and the upper level will be filled for two main tracks. With these tracks raised, traffic can be shifted to the new grade, the remaining half of the bridges constructed, and the filling completed.



East Half of the Track Elevation Work

Long Approach Grade is Required

Between Seventh avenue and the Hangman creek bridge, the double-track line follows the bluffs of Hangman creek for 2½ miles. The line is supported from 40 to 150 ft. above the creek, and 200 ft. below the brow of the hill. The material is coarse sand and gravel. In order to make an approach to the track elevation structure, it was necessary to raise the track over the entire limits of the ruling grade on the hill an average of 10 ft. The previous grade

At the beginning of the concrete work, mixing and placing was done by compressed air, the equipment being placed on a flat car with hoppers for sand and gravel overhead.

These hoppers were charged by a locomotive crane with a clamshell bucket which removed the material from supply cars. The discharge pipe from the mixer was 8 in. in diameter, and was fastened rigidly to the side of the car with bends, to discharge into the top of the retaining walls. The car was self-propelled so that concrete could be discharged into the forms at any point. Air was supplied from a compressor about 2,000 feet from the mixer. This plant did not prove satisfactory for this class of work, and was abandoned.

The mixer car was rebuilt to use an ordinary batch mixer, with a tower and hoist for building the remainder of the retaining walls. For all bridge abutments and slab bridges, a batch mixer with a charging skip is being used for the separate pieces of masonry.

Street excavation in solid rock is being handled with steam shovel and dinkey equipment. The material is used in the fill back of retaining walls and the approach from Erie to Division streets. Street excavation in loose material is being handled with a small revolving steam shovel and dump wagons.

Temporary Bridge for Street Traffic

In order to facilitate the excavation and street work at the intersection of Division street and Sprague avenue, a detour bridge 1,200 ft. long has been built to connect Riverside avenue with Sprague avenue at Hilliard street. It has a 6-ft. walk and a 24-ft. roadway, with two car tracks, and crosses over the Northern Pacific freight house, freight yard, and main tracks. This bridge supports water mains, power cables, street cars, and street traffic. The regrade district at this point is closed to the public during the reconstruction of these streets.

The work will be completed early in 1917. The general contract for masonry, concrete bridges, street work, and the temporary viaduct was let to the W. J. Hoy Company, St. Paul. As sub-contractors, the Van Sant-Houghton Company, San Francisco, is doing all concrete work, except placing the reinforcing; the Union Sand & Gravel Company, Spokane, furnishes sand, gravel and does the paving; Parker, Moran & Parker, Spokane, have the excavation work; Montague & Johnson are placing the reinforcing steel, and the Poole-Dean Company, Portland, has the erection of the steel bridge superstructures.

The rearrangement of tracks to take care of traffic during construction and the filling and relaying of tracks on the elevated plane, is being done by railway forces under the direction of M. F. Clements, assistant engineer in charge of all field work. The plans for the work were prepared by the Northern Pacific bridge department, H. E. Stevens, bridge engineer, and W. L. Darling, chief engineer.

FUEL ECONOMY ON THE ROCK ISLAND

W. J. Tollerton, general mechanical superintendent, Chicago, Rock Island & Pacific, in an article published in the March issue of the Rock Island Employees' Magazine, mentioned briefly the results of the systematic fuel economy campaign on that road and called attention to the possibility for further improvements. He said in part:

"The special department to effect economies in the consumption of locomotive fuel, under the general direction of the mechanical department, was organized in January, 1913. During the calendar year of 1915, as compared with the calendar year of 1912, on the basis of cost of fuel per 1,000 gross freight ton-miles, per 1,000 gross passenger ton-miles and per switch engine-mile, a reduction of $1,010,681.84 was effected in the cost of locomotive fuel. I will not attempt to apportion the credit for this showing, as it was simply due to the co-operation of all employees, and they are to be congratulated on this excellent performance.

"There are still very large opportunities for making further substantial reductions in the cost of locomotive fuel. For instance, during the fiscal year ended June 30, 1915, in freight service there was an average consumption of 16 scoops of coal per engine-mile, in passenger service 7.4 scoops per engine-mile and 9 scoops of coal per switch engine-mile. If a reduction of only one scoop of coal per freight engine-mile and one-half a scoop of coal per passenger and switch engine-mile can be effected, the following annual saving would result:

Freight service, 131,022 tons	$294,799.50
Passenger service, 67,496 tons	151,864.75
Switch service, 24,045 tons	54,101.25
	$500,765.50

"It is felt that with the continued co-operation of all concerned these figures could be exceeded. The main factors to be considered in accomplishing such a result are:

"Complete work reports by the engineers and prompt repairs by the roundhouse forces. This is also of vital importance in connection with the Federal requirements.

"Properly sized coal delivered to the locomotive tender.

"Locomotives should not be fired up an undue length of time in advance of the time they are needed, and care should be taken in building the fire.

"Proper instruction and co-operation of engine crews and terminal employees in the proper and economical performance of their duties."

THE BRADFORD COLLISION

The rear collision of westbound passenger trains on the New York, New Haven & Hartford at Bradford, R. I., on the evening of April 17, in which five persons were killed and three cars were burnt up (reported in the *Railway Age Gazette* April 21, page 891), was the subject of an investigation held jointly by the Public Utilities Commission of Rhode Island and representatives of the Interstate Commerce Commission at Providence, R. I., April 20, 21 and 22. The public inquiry was conducted mainly by Chairman William C. Bliss, of the Rhode Island commission, and Inspector F. A. Howard, of the federal body.

The first witness was C. H. Morrison, signal engineer of the road, who presented a plan of the scene of the accident. The leading train, No. 633, was standing at the station at the time of the collision, but none of its passengers had alighted. The station, together with a small freight house a few rods west, stood on the north or right-hand side of the train, and the signal cabin was on the south side of the road, a few feet in the rear of the train. From the point of collision distances, forward and back, are: Forward to the signal at the entrance of the side track, 400 ft; to the starting signal, 3,200 ft.; backward, to the point where the rear of train 633 had stood when it made its first stop, and whence the flagman went back, 300 ft.; to Pawcatuck river bridge, 1,000 ft.; to the home signal, 1,500 ft.; to the distant signal, 5,868 ft., the distant being 4,368 ft. in the rear of the home signal. At the dwarf signal location, entering the siding, there is also a high signal; so that westbound trains encounter a distant signal and three home signals in succession. The line throughout is straight and level.

Trains are operated under the controlled manual block system, and track circuits, for the control of signals or instruments, extend from the distant to the first home signal, from that to the second and from the second to the third. The distant signal is semi-automatic; that is to say, it goes to the horizontal position on the passage of a train past it.

The next witness was H. P. Haley, train despatcher, whose record showed that train 633 arrived at Bradford at 7:26 p. m., and that the collision occurred at 7:32. Discrepancies of one or two minutes were shown in some items of the records and these were discussed at some length, with a view to

checking the statement of the flagman, and of others, as to how far back the flagman's signal had been carried; but, because of numerous uncertain elements, little useful information was brought out. Train 25 was backed out of the wreck within a few minutes, but it was not until midnight that it was pulled back to the next station eastward; and then it was sent forward on the eastbound track at 2 a. m.

The cause of the delay to train 633, which was the occasion of the collision, was the inability of the fireman to make steam; but neither he nor the engineman could explain the nature of the trouble with the engine, which was No. 1106, fitted with a superheater. The engine had had its boiler washed the night before, and there was some testimony about evidence of leakage in the tubes of the superheater; but nothing definite. C. J. Stewart, assistant mechanical superintendent, examined the engine after the collision, and gave the boiler a hydrostatic test of 110 lb., including the superheater units. No leak was found. The spark netting, however, was found to be clogged so as to reduce the openings perhaps three-fourths. To this he attributed the failure of the engine to make steam.

To inform the despatcher of the trouble the engineman stopped his train a little short of the signal cabin and spent about four or five minutes going in to speak to the signalman and coming out and again starting his train. Then the train was moved forward to the station and was standing there when run into. The engine had not reached the siding switch. While the engineman was in the cabin, his train having cleared the home signal in the rear, the operator had released the signal at Wood River Junction, the station in the rear, for the admission of train 25 to that block section. Conductor French, of 633, testified that as he went into the signal cabin (with the engineman) he had seen his flagman's light, indicating that the man had gone back, he estimated, 1,500 ft.

These men of the crew of No. 633, as well as all other witnesses, were questioned as to the presence or absence of fog; but all, except Engineman Mansfield, of No. 25, testified that there was no serious obscuration of the view of signals.

All or nearly all of the witnesses were also questioned as to whether they had known of false-clear signals under the controlled manual block system, but the only case definitely brought out was one where the boom of a steam shovel had caused a cross between a Western Union wire and a wire leading to a distant signal; but this had been at once reported, and was repaired within 15 minutes. All questions concerning the integrity of the apparatus controlling the distant signal approaching Bradford, the one which Engineman Mansfield had claimed to have found in the clear position, failed to bring out any fault; and the position of the home signal, together with the checks imposed by the interlocking, showed that it must have been in the caution position. Engineman Mansfield, and his fireman, averred that the signal was clear, but there was nothing to corroborate their statement.

The Flagman and the Engineman

Flagman Coombs, of train 633, is 28 years old, and has been a flagman over seven years, but had been on this train only two months. He declared that he had gone back promptly, but he was not sure whether or not he had first to go to the front end of the rear car to get his white lantern. He said that he got as far as the switch between the bridge and the home signal (*i.e.*, about 1,100 ft.) when he saw that train 25 was coming, and he hastily lighted a fusee. The engineman did not answer his signals and he threw both the fusee and the lantern at the cab, or at some point on the engine. The engineman said that he had not seen either the lantern or the fusee.

Coombs said he thought he must have started in from 8 to 30 seconds after his train stopped. While going back he looked around and saw the tail lights of his train and also the home signal, a short distance ahead of the train, showing red. The flagman was hazy about the speed at which he went back, as also about many other circumstances. In the course of the investigation two men walked briskly over the course which Coombs is said to have taken and made the distance in a little less than 3 minutes.

Engineman C. H. Mansfield, of train 25, has been a runner since 1887, but looks less than 50 years old. He was questioned at length about the weather, about the circumstances of his run and his general knowledge of his duties. He was running that night nearly or quite on time; had made up a slight delay. He said that it was a misty night; there were fogs which "opened and shut." All the way from Boston he had had his coat on because of the dampness. Asked if the "land fogs" which he said prevailed in some places, caused any obstruction of the view of the signals, he said that in some cases they did and in some did not.

Q. Did you observe the distant signal at Bradford?
A. Sure.
Q. What color?
A. It was green.
Q. What did you do?
A. I hollered to the fireman "high ball."
Q. What did the fireman do or say?
A. He was stooping down; had been, I think, shaking the grates; and he answered something, and rose and looked out of the left-hand window.

Mansfield, describing the situation further, said that there seemed to be a fog rising at the river (which is a few hundred feet *beyond* the home signal); he came on to it suddenly. He was expecting to find the home signal green, and, suddenly finding it red, said to himself: "For Heaven's sake, how is this?" He at once threw on the emergency brake. He did not see any fusee. He said that the rail was bad, but he did not think that the wheels slid. He thought the engine would stop before striking the standing train; but it struck, at what he estimated was 8 or 10 miles an hour. He had been running at about 50 miles an hour. Train 25 broke in two at the fourth or fifth car. As before stated, Mansfield backed his train out of the wreck, and his engine could have proceeded with its load except for the failure of the main air reservoir.

Details of the Wreck

Conductor W. J. Reed, of train 25, supplemented the testimony of Conductor French, of No. 633, concerning the conditions immediately following the collision. Reed, when his train stopped, was not thrown to the floor, having grasped a handrail at the side of the car in which he was standing, the dining car. He thought that, after a few seconds, the wheels had skidded. He went back and found that all of the passengers in the two cars back of the dining car were sitting in their seats, and not for two or three minutes did he learn that there had been a collision. The smoke from the engine of 633 appears to have obscured the view to the west, the blower of this engine having been on constantly. Reed testified that the acetylene gas tank under the rear car of 633 exploded violently.

S. T. King, fireman of train 25, had been running with Engineman Mansfield two weeks; had been on this division off and on five years. He corroborated Mansfield's statement about the distant signal, but was not clear as to whether he continued on his seat until he had actually passed the signal. Asked about certain landmarks, he gave confused answers. The first he knew of his approach to the home signal was feeling the application of the brakes in emergency. "I expected to see an automobile or some obstruction on the crossing; I looked up and saw what I suppose was the home signal; then, I think, I saw the red and the white lights of the flagman; next the tail lights of No. 633. All these lights came so close together that it would be impossible to say just

what intervals there were between them." King expected that the engine would stop before striking the standing train.

Q. Passing the distant signal, did you look for the home?

A. No, I did not.

Q. In clear weather you can see the distant and the first two home signals all at once, can you not?

A. I cannot say.

Q. Was the red light of the flagman waved?

A. I could not say.

King hesitated long before answering even the easiest questions.

The flagman of train 25, D. W. Camp, a flagman for 20 years, thought his train had been stopped by a service application of the brakes, not an emergency application. Going back, he encountered Flagman Coombs, of 633, on the bridge. Coombs was anxious about his lanterns which subsequently were found in the ditch at the side of the road.

Camp thought there had been a shower, and that the rail was moist. He went back beyond the distant signal and remained there four or five hours, until an engine came to pull his train back to Wood River Junction.

Collateral Facts

In addition to the main features of the investigation numerous collateral facts of interest were brought out. Conductor French of train 633 estimated the total number of passengers in the rear car of his train, the one that was wrecked, at 15. The lights were immediately extinguished by the shock of the collision, and efforts to extricate imprisoned passengers had to be carried on in perfect darkness. The fire began about five minutes after the collision. It first broke out about the middle of the car, at which point stood the front end of the colliding engine. Of six fire extinguishers tried, two were found useless. None of the extinguishers was large enough to have any appreciable effect on the fire. The second car of the train and the station building were ignited about 10 minutes after the collision. While train 633 was standing at the station the brakes of the cars were off, but the independent brake on the engine was set.

The engine that failed was in fairly good condition except as to steaming. The fireman believed that it was leaking at the front end.

There had been some rain during the day, and there was some talk of a slippery rail, but no definite evidence that it was bad; and the condition of the brakes on train 25 was all right.

One trainman of train 25 said the atmosphere was foggy, but his testimony appears to have referred to a time two hours or more after the collision.

The engineman of train 623, which had passed about 30 minutes prior to the collision, said that the rails were slippery; and that there was enough mist in the atmosphere to make the signal lights dim. At the same time he said that he thought he had seen the first home signal at a point 1,500 ft. before he reached it.

Frank H. Nicholson, the signal inspector who had been riding on train 25, and who went back very soon after the collision, said that the weather was slightly foggy; but he said that he could see the home signal when about 3,700 ft. from it. Questioned further he said that the fog was not such as to seriously obstruct the view of signals.

George W. Wildin, mechanical superintendent, was questioned about the cause of the fire in the wreck. He assumed that a gas pipe had been broken, and that the gas had been ignited by the fire in the locomotive. He had not examined the gas tank with sufficient care to say anything about the explosion.

George A. Anderson, signal repairman in charge of this section of the road, had inspected and cleaned the lock and block apparatus at Bradford on April 15, two days before the collision. He had tested the slot coils about two weeks previous. There had never been any trouble from foreign current in this region. The line wires are of copper, in service about one year, and are covered with weatherproof insulation. He had had one false-clear indication, in 1915, at Wood River Junction, caused by water leaking into the circuit breaker at the home signal. The Bradford distant signal, motor operated, had been in service for a period of about one year.

Engineman Field of train 623 had found one false-clear controlled manual distant signal at Attleboro, about four or five years ago, but his memory of this case was not very distinct. He said that the block controlled by the signal was clear.

Recent Improvements in Service

C. H. Morrison, signal engineer, questioned generally about the signal apparatus, explained the operation of the controlled manual system. A foreign current in the track circuit at Bradford could not clear the distant signal because the wire circuit for that signal was broken by a circuit breaker at the home signal. If the distant signal should stick in the clear position, a back lock on the home signal lever would prevent the signalman from latching the home signal in the normal position; and this would make it impossible to unlock the proceed signal at the block station in the rear.

Asked about tests of relays, Mr. Morrison said that no systematic tests were made except when relays were sent into the shop for repair; then they are tested for drop-away and pick-up, and a record is made. Line circuits are regularly tested for resistance. The purpose is to test for grounds every six months.

Asked about progress in the testing and investigation of automatic train stops, Mr. Morrison said that since the Milford collision, February 22, a large number of letters had been received, and were given careful consideration. He has assigned one engineer to give his whole attention to the automatic stop question. Asked if any progress had been made in this field during the past three or four years he said that there had; a good deal of energy is now being put into the question, and much money is being spent by promoters and by the railroads.

P. T. Litchfield, superintendent of the division, was questioned about the make-up of passenger trains. Train 633 had a part of the time been made up of steel cars, but there were not enough of these to equip all trains, and the more important trains were supplied first. Wooden coaches are not allowed to be placed in trains between steel cars and the engine; and under this rule sometimes steel cars cannot be availed of when otherwise they might be put into a train.

Asked about the prevention of errors like that which caused this collision, Mr. Litchfield said that great pains had been taken to instruct all employees. All of the operating officers are making this their first business. Enginemen have all been instructed specifically and carefully that they must rigidly comply with indications of the distant signals. He had personally talked with large number of the men; and meetings had been held to impress on employees the seriousness of the situation.

C. L. Bardo, general manager, was questioned about the general operations of the train service department during the last two years. He gave the records of efficiency testing substantially as reported in the *Railway Age Gazette* in connection with the Milford collision. During the past three years the schedules of 921 trains have been lengthened and those of 709 others have been rearranged. There is a maximum speed limit, for all passenger trains, of 60 miles an hour on the main line, and a lower limit on other lines. The train despatchers are required to watch their records for any violation of this rule. Engineman Mansfield had been subjected to two tests at distant signals since March 1 and had properly obeyed the rule. He, with others, had been talked to.

The number of steel passenger cars now in service is 375, and, with 200 Pullman steel cars, making a total of 575, the road has steel passenger cars for nearly one-third of its passenger train service. Of the 200 steel cars yet to be received from the shops, a considerable number are delayed by the inability of the builders to procure wheels for them. A large number of cars have been fitted recently with electric lighting apparatus and about 1,200 cars now have this type of light. It is a rule that when steel cars are used in important through trains the trains shall be made up wholly of such cars; not of the two kinds mixed.

Rule No. 99, the flagging rule, is amplified in the New Haven code much beyond what is prescribed in the standard code of the American Railway Association. Mr. Bardo explained the reasons for this. It was not thought wise to leave so much to the judgment of the flagman, and the instructors test each man's judgment carefully under varying conditions. It is felt that "the flagman who has paid attention to what has been told him and has the ordinary degree of railroad sense is pretty well equipped as a flagman and ought to be pretty safe."

In its changes to improve efficiency, the company has established two additional operating divisions and has increased the number of examiners on every division. The number of trainmasters has been increased.

It is estimated that each week-day on the New Haven system the number of signal indications to be read by enginemen is 94,197. A comparison of this figure with the number of failures shows an exceedingly small percentage of errors. If an automatic train control device were to be put in use that would mean 94,000 additional movements, mechanical or electrical, to be made each day; and in spite of the best maintenance this would mean, no doubt, a good many additional failures of apparatus.

THE PREPARATION OF STOKER COAL

Early in the development of the locomotive stoker the necessity of delivering prepared coal to the firebox was recognized, but there has been considerable difference of opinion as to whether the preparation should take place before or after the coal is delivered to the tender.

The former practice has the advantage of simplifying the stoker equipment and reducing the amount of auxiliary power which must be supplied by the locomotive boiler, but at the outset it seemed to require the installation of crushers at coaling stations where stoker locomotives were to be served. This requirement detracts somewhat from the flexibility of operation, especially in cases where comparatively few stoker fired locomotives are in service, while crushing the coal on the tender confines the problem of handling stoker locomotives entirely to the locomotive itself.

It seems evident, however, that a supply of prepared coal may be secured with much less difficulty than was at first generally anticipated. The Baltimore & Ohio now operates over 230 stoker-fired locomotives, all of which are equipped with Street stokers of the type requiring the delivery of prepared coal to the tender. Several means of securing this coal are now in use or available, none of which required the installation of any mechanical equipment at any of the coaling stations. While the same practices may not be universally applicable, owing to the difference in conditions under which fuel supplies are secured, the experience of this road will be applicable in many cases.

The Baltimore & Ohio passes through extensive coal fields in West Virginia, Ohio and Pennsylvania, bituminous coal forming 46 per cent of the revenue tonnage handled during the last fiscal year, and the purchaser of fuel for company use is largely influenced by traffic considerations. It comes from many different mines and varies considerably in quality, both physical and chemical. It may broadly be divided into two classes: low volatile soft coals and high volatile gas coals. As far as practicable, each engine district is supplied throughout with one of these classes, although there are cases where locomotives receive both kinds.

For satisfactory operation it is generally considered that the stokers require coal not larger than nut run, that is, coal which will pass through a 2-in. bar, a 3-in. round or a 2½-in. square screen. Where these sizes are exceeded considerable attention is required on the part of the fireman to keep the lumps broken up over the conveyor screen on the tender. There are several ways in which coal to meet these requirements may be secured. Where there is a commercial demand for lump coal, it may be possible to secure a supply of screenings of the required grade at the mine. Where commercial conditions are unfavorable to this practice, run-of-mine coal may be purchased and screened either at the mine or when delivered to the coaling station. Under certain conditions it may be desirable to use crushed coal. This is being done in one case on the Baltimore & Ohio. The crusher is installed at the mine, however, and is not operated by the railroad.

When stokers were first being placed in service on this road they seemed to promise a saving in the cost of fuel because of the comparatively low-grade of coal required, which could be secured at a considerably less price per ton than the run-of-mine grade. For some time it was the practice to purchase screenings for use on stoker-fired locomotives. Later, however, this policy was discontinued, and as far as practicable the run-of-mine grade was purchased, the mines separating the lump from the screenings as required by the railroad company. The lump is utilized on hand-fired locomotives and the screenings on the stoker-fired engines.

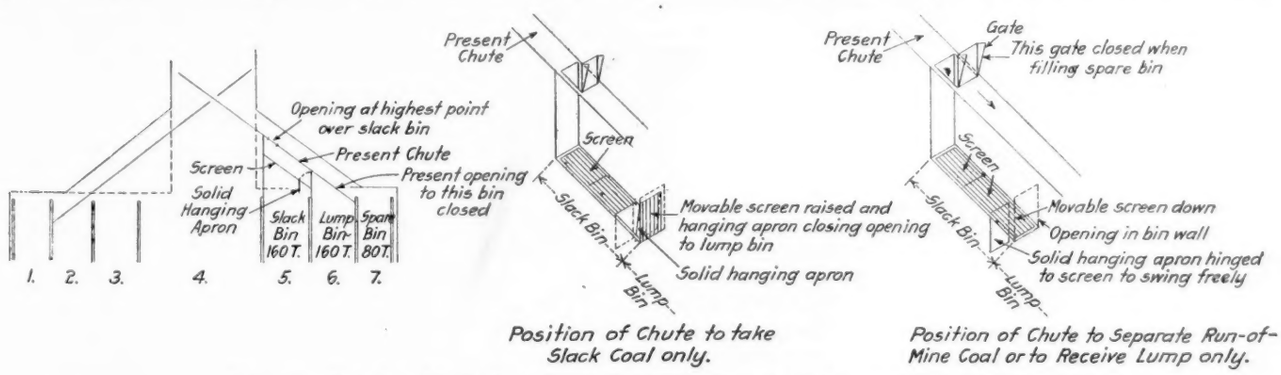

Present Chute
Opening at highest point over slack bin
Present Chute
Screen
Present opening to this bin closed
Screen
Solid Hanging Apron
Slack Bin 160 T.
Lump Bin 160 T.
Spare Bin 80 T.
1. 2. 3. 4. 5. 6. 7.
Movable screen raised and hanging apron closing opening to lump bin
Slack Bin
Lump Bin
Solid hanging apron
Position of Chute to take Slack Coal only.
Present Chute
Gate
This gate closed when filling spare bin
Screen
Movable screen down
Opening in bin wall
Slack Bin
Solid hanging apron hinged to screen to swing freely
Lump Bin
Position of Chute to Separate Run-of-Mine Coal or to Receive Lump only.

Diagram Showing Method of Screening Mine-Run Coal at the Coaling Station

Although not generally used, facilities have been provided at three coaling stations by means of which run-of-mine coal may be screened, the screenings and lump being delivered into separate bins. This offers a convenient solution of the problem at points where a comparatively small number of stoker-fired locomotives are in service, and the quantity of prepared coal required would not justify arrangements for

securing it direct from the mine. The separation of the finer grades from the lump also provides a better grade of coal for hand-fired locomotives than would otherwise be available. No difficulty exists in installing the necessary equipment in new coaling stations and where there is sufficient head room in existing plants to permit the placing of screens below the main chutes, the necessary alterations may readily be made. Such facilities have been provided at Cumberland, Md., Warwick, Ohio, and at the new station now under construction at Roby street, Chicago.

The sketch shows the arrangement of the screen in its relation to the main chute as it is being installed at Roby street. The same principle is used in the other stations, although somewhat modified to meet the local conditions. It will be seen that a bar screen is placed directly below the main chute over the slack bin, an opening being provided in the wall between the latter and the lump bin at the lower end of the screen. When run-of-mine coal is to be separated or lump coal is to be delivered into bin No. 6, a gate closing an opening in the main chute over the highest point in the slack bin is raised to a vertical position, thus closing the main chute and diverting all coal through the opening onto the screen below. At the lower end of the bar screen is a movable section, hinged so that it may be raised to close the opening in the bin wall. At the upper end of the hinged section is pivoted a solid hanging apron which drops down in front of the screen when it is raised, thus forming a solid barrier to the passage of coal through the opening in the wall. In this position all coal must pass into bin No. 5 and its use in this manner is confined to the handling of slack coal. When the movable section of the screen is dropped the apron hangs below the screen and swings freely, thus offering no obstruction to the passage of fine coal through the screen. In this position either lump coal or run-of-mine coal may be handled, in the former case the smaller sizes dropping through the screen into bin No. 5, and the lump passing on into bin No. 6.

On the Cumberland division approximately 50,000 tons of stoker coal are required per month, all locomotives in through freight service—about 150 in number—being stoker-fired. About 60 per cent of this coal is screened at the mines, the remainder being crushed at a mine at Tunnelton, W. Va. The product of this mine is of a poor quality and the entire output is taken by the railroad for stoker-locomotive use, the coal being prepared and delivered directly to the locomotives by the mine. The output is about 700 tons per day and the entire amount is required for delivery to stoker-fired road locomotives at the mine and for use at two nearby helper stations. Screening was impracticable since it would have necessitated the shipping in of an additional supply of stoker coal as well as the movement of the lump coal. A crusher was therefore installed, the coal being delivered to it from the picking table and thence elevated by a bucket conveyor to a 1,000-ton storage bin. The storage bin is several hundred feet back from the main line tracks and road engines receive coal from a motor-driven travelling hopper which operates on a steel trestle with a plate girder span over the main line tracks.

Tunnelton is 19 miles east of the western terminus of a 78-mile engine district, and by coaling all freight engines at that point, on both east and westbound trips, it is unnecessary to take coal at the west end of the district.

Coal is supplied to Hardman and M. & K. Junction from the Tunnelton mine. At these stations, which are respectively nine miles west and seven miles east of Tunnelton, are maintained a number of Mallet locomotives in helper service on the adjoining eastbound grades.

By the installation of the crusher in this case it has been possible to secure considerably more than half of the stoker coal required in the engine district with the movement of a small tonnage for very short distances, thus keeping the non-revenue ton-mileage to a minimum.

PRESIDENT RIPLEY ON WAGE DEMANDS OF TRAIN EMPLOYEES

E. P. Ripley, president of the Atchison, Topeka & Santa Fe, has addressed the following letter to the employees of the road regarding the demands of the train service employees:

"I suppose every man in the employ of the company realizes that he can get justice whether he belongs to one of the unions or not. Our position is that if he belongs to a union and chooses its officers as his representatives he loses no rights, but neither does he gain any, because it is the policy of the company to be just to those inside as well as outside the unions.

"But when our men authorize a union to say to us—we demand certain changes in pay and conditions, and propose to have them by force if not granted; when they say that they will not arbitrate, but will have what they demand whether right or wrong—then we, as those charged with the interests of 40,000 stockholders, must necessarily demur.

"The officers of this company are charged with a threefold duty—to the public, to the owners, to the employees—and they are doing the best they can to deal squarely with all three. They are hampered by various laws supposed to be in the public interest; they have yielded (sometimes perhaps unwisely) to the demands of organized labor. They have done their best—they cannot consistently grant the present demands and retain their self-respect, or the confidence of their stockholders.

"Any advice I might at this time give to the employees making these demands might be misconstrued, and yet it seems to be my duty to say to our men that the course they are pursuing is a mistake; that they cannot compel us by threats of a strike to consent to demands that we believe to be radically unjust; that real grievances will have the same consideration as in the past when presented by any employee either in or out of a union.

"There may be roads where membership in an organization is a necessity for the protection of the individual—no such necessity exists on the Santa Fe, and, while the company disclaims any objection to the fraternal organizations it desires to emphasize its intention of dealing exact justice to all, whether members of such organizations or not.

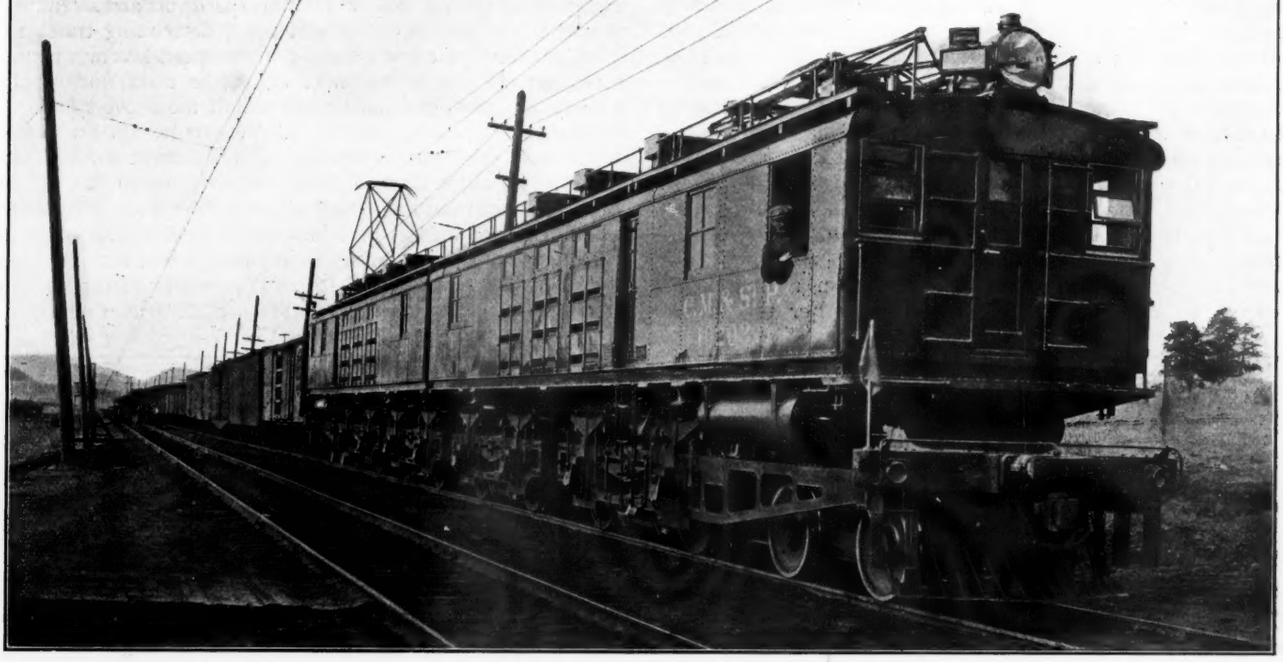
"Employees of the Santa Fe are noted the country over for loyalty and 'esprit de corps'—we like to think they are a higher type than is usually found elsewhere and that they would hesitate to leave their certain and well-paid positions and the privileges they enjoy to engage in a conflict, the result of which is at least doubtful, at the command of organizations composed largely of men employed on other roads.

"Every one of our officers has grown up in the ranks and knows the duties and the feelings of a subordinate. I would advise every one of our employees to talk the present conditions over with his immediate superior so as to get the latter's viewpoint. A strike will cost the company a great deal of money—perhaps necessitate the passing of one or two dividends, and working much hardship on many innocent people. But it will not help the men, and after the loss of wages and standing other men will take their places and the work go on. Is the game worth the candle?

"The men who pull the throttle, or feed the fire, or ride the freight trains, or wield the conductor's punch, are no more necessary to the operation of the railroad than those who care for the track, or build the bridges, or the engines, or those who work the pen in the various stations, or offices. All may by their efforts contribute to the amount to be divided, but no amount of quarreling as to the terms of the division will make that amount larger. If everybody will work for greater earnings he may be sure that he will get his share—but he cannot permanently increase that share by grabbing for it."

Operation of the St. Paul Electrification

Results Obtained on First Engine Division During the Past Four Months Have Been Entirely Satisfactory



A 1,650-Ton Freight Train Regenerating on a 2 Per Cent Grade at Grace, Mont.

SINCE December 9, 1915, when the Chicago, Milwaukee & St. Paul's crack transcontinental "Olympian" was taken from Butte, Mont., to Piedmont by an electric locomotive the first engine division of the electrified zone has been in continual electrical operation. Both the "Olympian" and the "Columbian" have been hauled by electric locomotives since the inauguration of electric service, but it was not until January that steam freight locomotives were entirely removed from the electrified division.

The electrification has, in every way, exceeded the expectation of both the railroad officers and the manufacturers of the equipment, and, considering that this installation is the first to use 3,000 volts direct current, the regularity of operation and the remarkable freedom from trouble with the locomotives and the catenary system has been extremely gratifying. It has been found that the contract capacity of the locomotive, which was 2,500 tons on a one per cent grade with one locomotive at a speed of approximately 15 miles an hour can easily be exceeded and as soon as the side tracks on the mountain division are made long enough to take care of the longer trains, it will probably be arranged to increase the train tonnage to 3,000 tons over the mountains, to 3,450 tons between Deer Lodge and the mountain and to 4,500 tons between the Bitter Root mountains and Deer Lodge, all with one locomotive, except that over the short heavier grades a helper will be used.

D. A. Goodnow, assistant to the president of the St. Paul, in charge of electrification, is reported in an interview as saying that the mileage of the electric trains for 24 hours is about 200 as against 114 by steam locomotives, that 24 steam locomotives—Mallets, and other heavy types—have been released with only one-fourth of the electrification in operation and that the work is being done faster and cheaper with the nine electric locomotives.

The question of hauling capacity of an electric locomotive is perhaps not thoroughly understood by the steam locomotive operator. His chief concern is to keep the steam locomotive hot and make steam, while the electric designer so proportions the motors that they will keep cool with the assigned tonnage.

The electric motor should not operate at much more than 125 degrees Fahrenheit above the surrounding air, as higher temperatures will cause an unduly rapid deterioration of the installation covering the copper conductors. Hence the somewhat baffling statement can be truly made that the electric locomotive will haul a greater tonnage in winter or cold weather than it will in summer, in this respect just the reverse of the performance of the steam locomotive.

Another point in the hauling capacity of the electric locomotive is that for short periods of time it will haul anything up to the slipping point of its drivers. Normally the tractive power of the electric locomotive is approximately 16 per cent of the weight upon the drivers but for short periods it can exert 30 per cent and for one hour it can exert 20 per cent of this weight. Illustrating this; a 2,300-ton train, on the St. Paul, was being taken westbound from Piedmont up the 2 per cent grade with one locomotive at the head end and a helper at the rear end. The train broke in two leaving approximately 2,000 tons on the head end locomotive. Instead of cutting off the bad order car it was decided to proceed up grade to the next station and in this case one locomotive actually hauled 2,000 tons up a 2 per cent grade without a helper. As this machine is rated at only 1,250 tons the performance gives an idea of the tremendous overload which such a locomotive can haul for a short time. Continued operation at this heavy overload would, of course, result in the destruction of the installation of what is known among electrical men as "burning out of the motor."

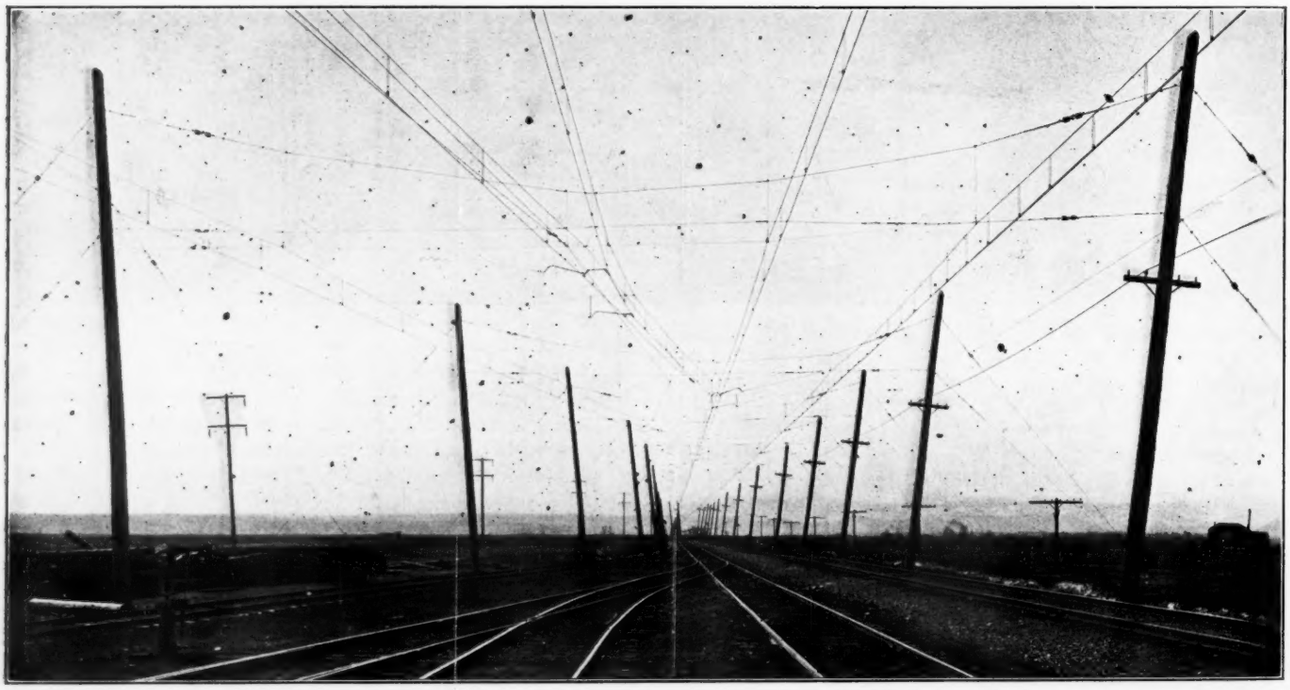
The electric locomotives, and in fact all of the electric equipment on the St. Paul, has been given a severe test dur-

ing the past winter, which, because of the deep snow and the severe cold, was one of the worst in the history of Montana. It is reported that the electric operation, during this period, was conspicuous for its complete reliability and freedom from trouble. It is true that a regulator which is used in connection with the motor generator on the locomotive to supply low voltage current for lighting and control was not quite up to the capacity required and therefore gave some trouble and also that some other minor troubles were experienced with a few of the cam operated switches. None of these troubles were serious, however, and it proved to be a simple matter to overcome them. One of the surprising operating conditions met with was the frosting of the electric locomotives when they were taken into a steam locomotive roundhouse after operating in a temperature of from 20 to 30 below zero. It was found that frost and ice would collect on all parts of the electric locomotive in a surprisingly short time. This trouble, of course, would not be so noticeable and, in fact, would probably not occur in a roundhouse which did not house steam locomotives. For this reason when the division is entirely electrically operated the trouble from frost should be eliminated.

A feature of especial interest in electrical operation of both passenger and freight trains on the St. Paul is the method of hauling these heavy trains when descending long mountain grades. It is a well-known fact that it requires the highest class of air-brake equipment and great skill in handling, to eliminate the danger of dropping a heavy freight or passenger train down a long sustained grade, when hauled by a steam locomotive and equipped with the usual automatic air brakes. Even on a two per cent down grade it frequently happens that brake shoes become red hot and wheel rims become greatly overheated, as practically all the potential energy stored in the train at the top of the mountain grade must be dissipated as heat in the brake shoes and wheels during the descent.

The St. Paul is the first to introduce electric braking with the direct current electric locomotive and it has proved not only entirely practical under the severe conditions appearing in regular service but the great operating benefit to be secured has also been demonstrated. When the motors are driven mechanically, as when a heavy train pushes a locomotive down grade, they act as a brake in converting this mechanical power into electricity which becomes available through the trolley system to haul other trains up grade. The same latitude in speed variation with electric locomotives is provided when braking as when operating up grade under power. The normal speed of an ascending freight train is 15 m. p. h. and for a descending train, 17 m. p. h., but if, for any reason, a lower speed becomes necessary, such as over a section of bad order track undergoing repairs, the speed can be dropped to half the above value.

The sub-stations in the St. Paul electrification are somewhat more than an average of 30 miles apart and should there be no other trains between sub-stations to absorb the power given to the trolley by a descending train this power passes through the sub-station machinery, is converted from direct current to alternating current and is sent into the high potential 100,000-volts distribution system connecting all sub-stations and becomes available for use over the entire 440 miles of electrification. As a descending train will not give out quite as much power as it would absorb when ascending the same grade, there will always be a demand for power in excess of that given out by the descending train and this fact taken in connection with the large industrial load connected to the same hydraulic power system makes it possible to dump into the transmission system any amount of power which the descending train may give out.



Line Construction in Switch Yards at Three Forks, Mont.

Aside from the economies resulting from electric braking, which are a possible saving of some 50 per cent of the total power demand, the elimination of brake shoe and wheel wear and the easier operation on the track, particularly when rounding curves, the greatest advantage resulting from the use of electric brakes lies in the elimination of the difficulty attending the use of air brakes in holding back long heavy trains when descending mountain grades. The electric braking of the St. Paul electric locomotive entirely relieves the air brake except for the stopping of trains or for emergency use. There is, therefore, provided a duplicate braking system, each one capable of holding a train on a down grade

and there is thus offered a greater guarantee of safety in operation than would be possible with the use of the air brake alone.

It is an impressive and convincing demonstration to witness the operation of a 75-car train weighing 3,000 tons, between Deer Lodge and Harlowtown, a distance of 225 miles over the two mountain ranges, without the use of air brakes except when trains are required to stop. There is an entire absence of the grinding of brakes hitherto considered a necessary accompaniment of mountain railroading and all increased operating benefits are furthermore procured.

Since electric operation has been started on the St. Paul, the heavier trains are taken down the 20 mile 2 per cent grade (the heaviest one on the division) without air brakes, more steadily and smoothly than they were on the level and the attention to brake shoes and wheels and the stopping for inspection has been done away with entirely.

STORY OF ALI BABA AND THE FORTY RAILROAD COMMISSIONS

(A Fairy Tale)

By Blewett Lee

Once upon a time there lived in the Youessay two Railroads who were brothers, one named Cassim, and the other Ali Baba. Cassim had a large business in coal, iron and grain, and became one of the wealthiest and most considerable of Carriers. Ali Baba, on the other hand, had nothing but a local lumber traffic, and not much of that.

One day, when Ali Baba was soliciting lumber business and absolutely up a tree, he saw a tribe of horsemen coming toward him. They were all well mounted, each riding an Office, and with a sharp Order stuck through his belt, and their wallets were full of taxes, depots, fares, grade crossings, and other valuables. Ali Baba counted forty of these horsemen—there were really forty-eight, but they were so active and perpetually fighting that he always lost count when he came to forty. One, who seemed to be the captain of the band, was a long skinny person who wore the collar of the Association known as the Kornbellut Meetprodeusahs, one of the fiercest tribes of the Shippahs. He came up to a rock which stood in the way, and pronounced distinctly these words, in a language which Ali Baba remembered to have heard when he was a child, "State's Rights." As soon as the captain of the band had uttered these words, a door opened in the rock, and after he had made all his band enter before him, the captain entered and the door shut itself.

Ali Baba remained up the tree until the forty came out again, mounted their offices, and returned by the way they had come. When they had gone, Ali Baba descended to the front of the rock and pronounced the words, "State's Rights." The door instantly flew wide open.

Ali Baba was surprised to find a cavern well lighted and spacious, and filled with precious stores of Interstate Commerce. There were rich bales of silk stuff, brocade, and valuable carpeting, and every kind of treasure of art and handicraft. It was evident that there were incalculable riches inside the cave. He gathered together such as he was able to carry away, and by the use of the words, "State's Rights," he found his way out again and returned to the city.

The effect of Ali Baba's carrying Interstate Commerce from the cave was that he found himself in possession of a heap of gold. This was discovered by a crafty Accounting Officer in the service of his brother, Cassim. Cassim then threatened to denounce Ali Baba to the Commander of the Faithful, falsely, as being a member of a Trust or Combine, and so compass his ruin. Under this compulsion, Ali Baba told Cassim the secret of his wealth.

With this information Cassim also went to the cave and pronounced the words, "State's Rights." The door opened immediately and when he had entered, closed upon him. He found therein so much more riches than he imagined, and was so anxious to move the priceless Interstate Commerce which lay all about him, that he forgot the ancient and mysterious words he was to speak. Instead of saying "State's Rights," he said "National Sovereignty," "The Constitution," "United States," "Free Trade," "Simple Justice," "Square Deal," "Common Sense," and a great many other things which might have moved a door of stone, but it was to no purpose.

About noon the forty Commissions came to visit their cave. They saw in the distance the line which Cassim had made for the purpose of moving the Interstate Commerce, and were greatly alarmed. They dismounted and some of them went directly to the door with naked orders in their hands, and upon pronouncing the proper words, it opened. Cassim tried to escape, but the Commissions with their orders soon deprived him of his life.

The Commissions held a counsel and could not imagine how Cassim had gained entrance to their cave or discovered the treasures of Interstate Commerce there. They decided to cut Cassim's system into four quarters, to hang two on one side and two on the other, within the door of the cave, in order to terrify anyone else who might attempt to enter.

Cassim's stockholders were very uneasy when darkness approached and Cassim did not come back. They spent the night in tears, and when morning came they ran to Ali Baba in alarm. Ali Baba went at once to the cave, and when he pronounced the words, "State's Rights," the door opened and he was filled with horror at the dismal sight of his brother's four quarters. He entered the cave and took down the remains and carried them away with him, and in spite of his fears he also carried away some Interstate Commerce, selecting only the most valuable articles.

When he returned to his house, he consulted with his handmaid, Morgana, an intelligent slave, whom Ali Baba knew to be faithful and resourceful in the most difficult undertakings. At the advice of Morgana, an old cobbler by the name of Foarklosiah was brought in and sewed together the quarters of Cassim's system, so that he appeared to be reorganized, only there was no life in him.

Cassim had a great funeral and his body was followed to the grave not only by stockholders, but by many bondholders as well. There came also many holders of life insurance policies, and those who had savings bank deposits besides, and a great number of Shippahs who, now that Cassim was gone, found that they missed him very much.

When the forty Commissions found that Cassim's body had been removed, and that some Interstate Commerce had been moved also, they said amongst themselves, "It is evident that some railroad has been moving Interstate Commerce, and has made good its escape. He evidently must have been in league with the one we found here. Let us send one of our number to the City and ascertain if any railroad has lately died a strange death."

One of the Commissions, therefore, came to the City and accidentally fell upon Foarklosiah. The Commission saluted him, and had no difficulty in ascertaining from him that Foarklosiah had recently sewed a railroad up. Upon the Commission's insistence, Foarklosiah finally led the Commission to the house of Ali Baba. Having found the house, the Commission marked the taxes up high on Ali Baba's door with a piece of white chalk.

A little while after the Commission had gone, one of Ali Baba's servants discovered that the taxes had been marked up on the door, and so she made similar marks upon the doors of all the neighbors' houses.

Meanwhile the Commissions had armed themselves and in

the night gathered in front of Ali Baba's house, but they could not for the life of them tell who had paid the taxes which had been marked on Ali Baba's door. Increased expenses were marked on all the houses round about, and in every place they heard groaning about the high cost of living, so they were compelled to return to their cave without knowing who it was that had ultimately paid Ali Baba's taxes.

As the safety of the Commissions required that an injury should not go unpunished, another Commission offered to go into the City and see what he could discover. He also succeeded in finding old Foarklosiah, and having been shown Ali Baba's house, this time instead of marking up the taxes he marked the profits away down with red chalk.

Not long afterward Ali Baba's servant, whose eye nothing could escape, went out, and seeing the chalk marks, marked down the profits on all the neighbors' houses in the same place and manner.

The second Commission on his return to the cave reported his adventure, and the captain and all the band were overjoyed at the thought of immediate success. They went into the City the same as before, but when they came to the street where Ali Baba resided they found that profits were marked down in houses all along the street, and there was much wailing in the houses at hard times, and mourning over lost profits, so that once more the band returned to the cave in distress.

This time the captain took upon himself the important task of ascertaining who was moving Interstate Commerce. He also addressed himself to Foarklosiah, who did him the same service that he had for the two Commissions. The captain did not mark the house with chalk, but he examined it so carefully that it was impossible for him to mistake it. Well satisfied with his attempt, he returned to the cave and said to the Commissions, "Now, comrades, nothing can prevent our full revenge, as I am certain of the house." He then ordered the members of the band to go out in the villages round about and buy twenty-four mules and forty-eight large leathern jars, one full of oil, and the others empty.

The captain, after putting one of his Commissions into each of the jars, rubbed the outside of the vessels with the Oil of Popularity. He then led the mules through the streets until they came to the house of Ali Baba. Ali Baba was sitting on his housetop, after supper, to take a little fresh air. The captain addressed him and said, "I have brought some oil a great distance to sell at tomorrow's market, and it is now so late that I do not know where to lodge. If I should not be troublesome to thee, do me the favor to let me pass the night in thy house." This was arranged, and Ali Baba bade his servant prepare a good supper for his guest.

When preparing supper, Ali Baba's servant discovered that the Oil of Popularity was almost missing in the house. She remembered the oil jars brought by the stranger, and went into the yard. When she came to the first jar, the Commission within said softly, "Is it election time?" She was naturally surprised to find the Commission in the jar, instead of oil, but she immediately apprehended the danger to Ali Baba, and with great presence of mind said, "Not yet, but soon." She went this way to all the jars until finally she came to the jar containing the Oil of Popularity.

Ali Baba's servant made what haste she could to fill her oil pot. She then took a great kettle and filled it with the Shreveport Doctrine, which was hot stuff. As soon as it was ready she went forth and poured enough of it on each of the Commissions to prevent their interfering any more with Interstate Commerce.

When the captain of the Commissions gave the appointed signal, he found it impossible to get any of the Commissions to interest themselves in national affairs. Going to the first jar he smelt the Shreveport Doctrine. Enraged to despair at having failed in his design, he forced the lock on the door and ran for Congress. In this way he made good his escape.

When Ali Baba found that the Commissions were confining their attention to local affairs and no longer interfering with national business, he set out again for the cave. When he arrived there, he pronounced the ancient words, "State's Rights," and the door opened immediately.

From this time forward, Ali Baba began to move Interstate Commerce very greatly and with entire freedom. His good fortune spread to his neighbors, and the whole City became very prosperous by reason of the Interstate Commerce which came there. Ali Baba, obedient to the Prophet, had a large harem, and many little railroads were reared in his house, which afterwards proved to be of great usefulness and honor, so that the whole land was filled with prosperity because of the Interstate Commerce which had been brought out of the cave.

BOILER STEEL AND CORROSION

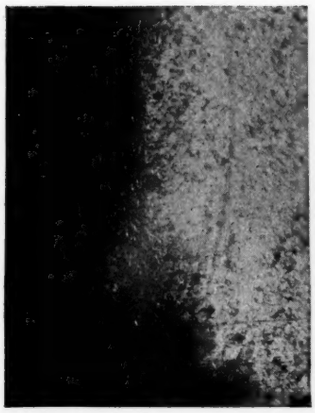
By Geo. L. Fowler

The corrosive grooving of the plates of a boiler shell next to the horizontal seams, that was so common a number of years ago because of the bending of the metal at that point, has been quite done away with by the improved methods employed in forming these seams. But corrosive grooving still takes place at other points in a boiler where there is either a bending movement of the metal, where it has been injured in flanging, or where the quality of the metal is such as to promote corrosion.

A—Homogeneous Steel Tube

B—Steel Tube Showing Slag Enclosures

C—Steel Tube Showing Slag Flow



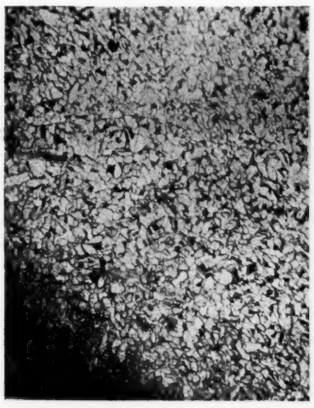
Edge B

¼ in. from Edge A

⅛ in. from Edge A

Edge A

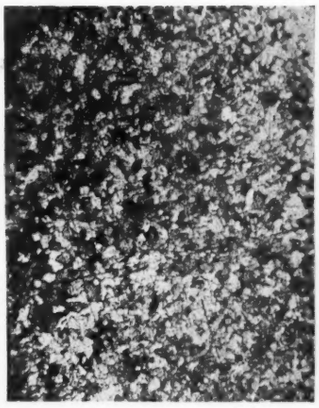
Microphotographs of Homogeneous Steel



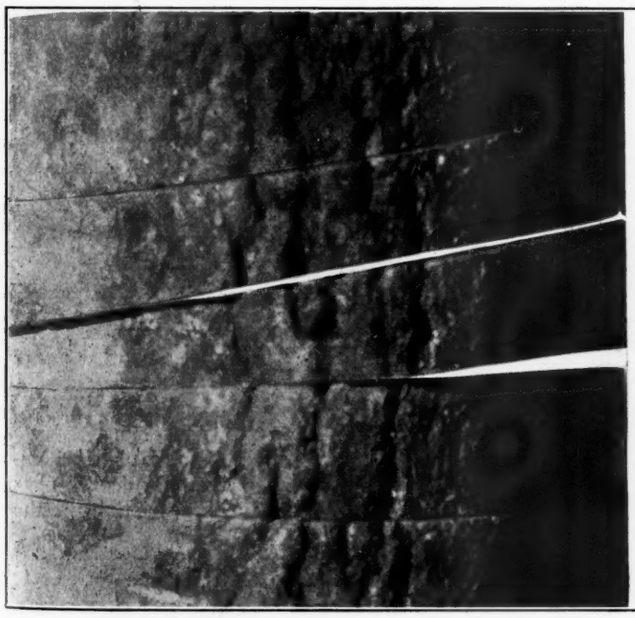
Fire Side Surface of Non-Homogeneous Corroded Steel

Face of Non-Homogeneous Corroded Steel Sheet

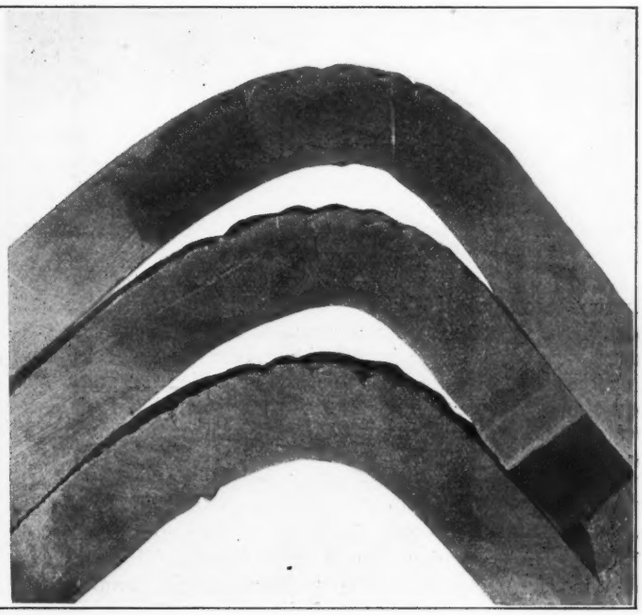
Water Side Surface of Non-Homogeneous Corroded Steel



Surface of Homogeneous Steel



Corroded Tube Sheet



Cracks at Bottom of Grooves

An exaggerated action of this sort was recently developed in some locomotive boilers where deep groovings occurred on the bend of the flanged portion of the back tubesheet. The general appearance of this corrosion is shown in the accompanying reproduction of a photograph. It was suspected that these groovings were following the lines of cracks that had either been formed in the sheet at the time the flanging had been done, or had developed later under the bending stresses to which this portion of the sheet is subjected, when the boiler is at work. The latter is probably the true explanation as it is not likely that sheets flanged and used by reputable builders could have been cracked to the extent that occurred, without having been detected by inspectors. A piece was cut from one of these sheets and an examination of the sections showed that cracks did extend down into the metal from the bottom of nearly every groove, and sometimes more than half way through to the other side, as shown in the illustration.

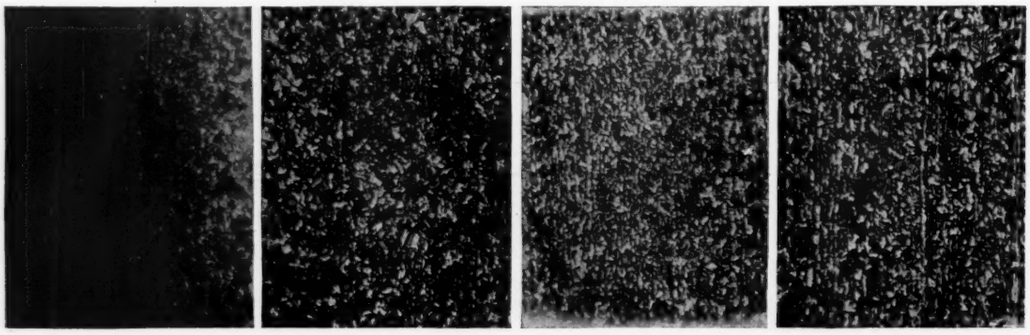
Coupons were cut from the side sheets of fireboxes made from the same steel and bent double on themselves cold as shown. Of the two bends, in the one marked 1, the sheet was bent with that portion which had been exposed to the fire outward, and in the one marked 2, that side which had been exposed to the water was outward. In both cases the metal was badly cracked; it had not been burned. In distinction from this, the lower piece upon which the other two rest shows a piece of high grade flange steel that had been bent double on itself, when cold, without showing any crack or flaw.

The corrosion of such a tubesheet is readily explained. The cracks made during the flanging process or developed by bending in service gave the water access to the interior of the sheet and corrosion was at once started. This was accelerated in two ways. The variation in the temperature of the tubes from that of the shell of the boiler causes the face of the tubesheet to move back and forth like a bellows. This yielding is concentrated at the flange. Two things then happen to increase the rate of corrosion, the metal of the sheet is strained and the cracks are opened and closed.

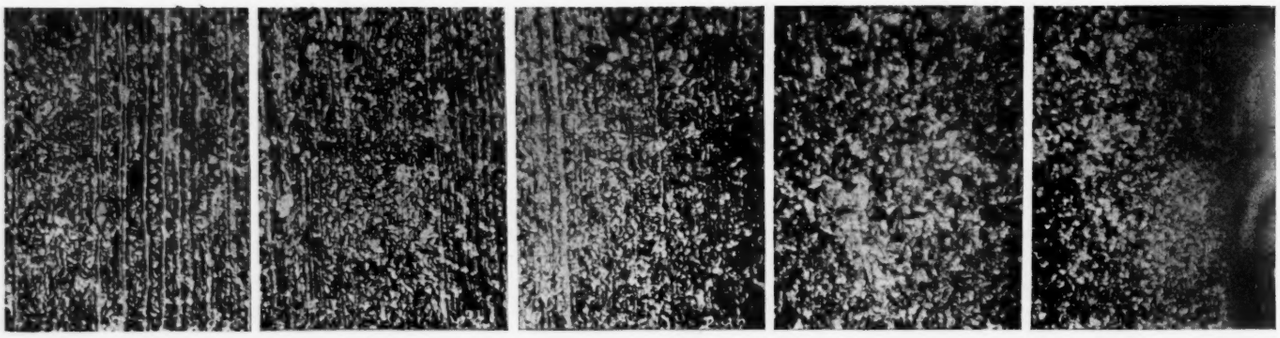
It has been demonstrated beyond any doubt that a steel under stress will corrode more rapidly than the same steel not under stress, the other conditions remaining the same; so that the reason why corrosion occurs at certain points in a boiler cannot be attributed solely to the presence of a corrosion agent that acts in certain particular places. But it is safe to assert that corrosion is more rapid as the stress on the sheets is greater. This, in connection with the cracks, suffices to explain the corrosion in the curved portion. In such cases the metal is subjected to special strains, under the influence of which the parts have less resistance to corrosion. This explains why parts that have been subjected to defective flanging are affected by corrosion to a greater extent than similar parts made of good material. As already stated, the action of any corrosive agent whatever cannot, of itself, fully explain this phenomenon. Although it may not be possible to avoid corrosion entirely, it may be considerably reduced by using the best material and by giving the greatest care to the processes of flanging and increasing the radius of curvature as much as possible.

There is another cause of corrosion due to the use of poor material. It has been proved that a non-homogeneous steel will corrode more rapidly than a homogeneous steel, because of the electrolytic action set up in the body of the metal itself. This does not refer to the homogeneity called for in the specifications for firebox steel of the American Railway Master Mechanics' Association, which refer to physical defects such as seams and blowholes, but to chemical defects due to the segregation of the impurities, variation in the structure and the like.

In order to give a graphic illustration of this point a small piece was cut from the sections marked 1 and 2 in the photograph of cold bending tests. It was polished and etched with a dilute solution of nitric acid, and then microphotographs were taken at intervals of about 1-32 in. across the



Fire Side Edge | 1/16 in. from Fire Side | 3/32 in. from Fire Side | 1/8 in. from Fire Side



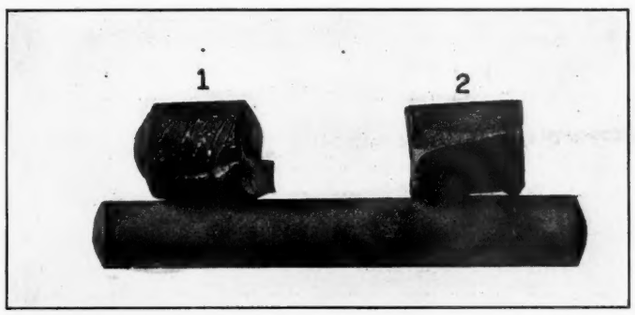
7/32 in. from Fire Side | 9/32 in. from Fire Side | 5/16 in. from Fire Side | 11/32 in. from Fire Side | Water Edge

Microphotographs of Non-Homogeneous Corroded Steel

section. The magnification used was 87 diameters and the distance between field centers is such that they nearly overlap. In this series we have a case of a great change in the structure of the steel from the surface to the interior and then back to the other surface. The difference between the structure at the center and the surface is so great as to be startling.

Another series is also presented of a similar section cut from the steel that withstood the cold bending test, shown below 1 and 2. In this the structure was without change from face to face so that but two interior sections are shown, each 1/8 in. from the surface. In connection with each series, microphotographs are shown of the surface, and it will be seen that there is a remarkable similarity between them. Two are of the defective or corroded steel, one of each face, and one from the other steel. It will be seen that the two surface microphotographs as well as those taken close to the edge of the defective steel show a fine, even grain that is very similar to, though not quite as uniform as the corresponding photographs from the other steel. The latter are so uniform throughout that no comment is necessary.

On the basis, then, of the electrolytic theory of corrosion, this non-homogeneous steel would be an exciter of corrosion



Bent Homogeneous and Non-Homogeneous Steel Plates

as compared with the other, because of the wide differences in the internal structure of the former. This means that a steel of the type shown and used is far more liable to corrode than would one of a more homogeneous structure, and that structure would serve to accelerate what might be called the natural tendency to corrode of a homogeneous steel of the same chemical composition.

The same variations were found to exist between two brands of tubes. In one, as in the photograph marked *A*, the structure was homogeneous, in the other (photograph *B*), there was not only a variation in structure, but slag enclosures were quite frequent.

These may appear matters of minor importance, but where boiler waters are used that have an acid reaction, too much care cannot be exercised that the steel not only comes up to the physical requirements called for by the specifications, but that it is of such a homogeneous structure as not to be an exciter of corrosion, and certain variations in the durability of tubes subjected to the same service and using the same waters can be readily explained by this variation in their structure.

THE BOLL WEEVIL'S APPETITE.—The Southern Railway's live stock and dairy instruction cars have been traveling over the Macon & Birmingham, and were in Macon (Ga.) for a recent week-end. The dairy agents of the Southern Railway are assisted by dairymen of the State Department of Agriculture and the State College of Agriculture. These men give illustrated lectures not only on dairying but also on early planting, clean cultivation, crop rotation, early varieties, destroying stalks in the fall, fertilizing, and the feeding habits of the weevil.

SCHOOL FOR STATION MEN

E. L. King, superintendent of telegraph of the Southern Pacific, has established a station school at San Francisco at which telegraph operators and station men anxious to qualify themselves for promotion to positions of agents are given a course of instruction, ranging from three to four months, in various phases of station work. J. J. Miller, formerly agent at Red Bluff, Cal., is instructor. At present the class numbers 20, and as soon as they are graduated others will become eligible to their places. Half of each day is spent in the class room and the balance of the time is devoted to actual station work. The various features of the station agent's duties are taken up in detail, including the subject of handling and filing tariffs, freight rates and passenger fares, meeting the public, handling shipments, etc. Representatives from various departments of the general offices will give talks to the students from time to time. The students are paid salaries while in attendance.

SIGNAL OPERATION ON THE HUDSON & MANHATTAN

The Hudson & Manhattan Railroad—operating the local tube lines between New York and Jersey City—in connection with the preparation of its records which, for the year to June 30, 1915, secured the Travelers Insurance Company gold medal, made up a statement of the operation of its block and interlocking signals, a summary of which was given in the *Railway Age Gazette* of March 17, page 513.

Responding to our request for details of this record, an officer of the road has given us the following statement, brought up to December 31, 1915; and in this connection we are informed that none of the failures belonged to those classes termed "dangerous." In other words the records for the twelve months show no false-clear indication. This company operates about 8 miles of line, all double track, and runs about 1,800 trains a day.

SWITCH AND SIGNAL FAILURES; YEAR ENDING DECEMBER 31, 1915

Causes.	Delays Number	Delays Amount Minutes	Totals Number	Totals Amount Minutes
Signals—				
A. C. relay	2	10		
Broken or grounded wires	7	16½		
Careless repairmen	3	19		
Fuse	8	21½		
Insulated joint	3	9		
Low voltage	1	2		
Broken contact spring	2	4		
Broken air pipe	1	2		
Ballast under stop arm	1	1½		
Loose nut	1	1		
Unknown	2	2½		
Total			31	89
Automatic Stops—				
Fouled mechanism	1	2		
Clutch loose on armature	1	1		
Loose toggle	1	2		
Fuse in stop control	1	3		
Defective clutch	1	2		
Broken nipple in air line	1	1		
Water in air line	1	2		
Total			7	13
Switches—				
Broken or grounded wires	1	1½		
Broken air pipe	1	3		
Broken spring	1	1½		
Detector bar fouled	1	3		
Broken rod	1	4		
Obstruction in point	4	9½		
Out of adjustment	2	5		
Careless repairman	1	3		
Loose clutch on pole changer	1	2		
Loose throw rod	1	6		
Loose saddle in pole changer box	1	3		
Total			15	41½
Grand total			53	143½

	Operations	Failures	Average operations per failure
Signals	62,365,925	31	2,011,804
Automatic stops	31,969,791	7	4,567,113
Switches	4,349,743	15	289,983

General News Department

The Norfolk & Western has made an advance of seven per cent in the wages of many classes of employees who are not members of unions. Those mostly affected are clerks in the general offices.

Milo R. Maltbie, formerly a member of the New York State Public Service Commission First district, has been appointed Chamberlain of the city, virtually an assistant to the mayor in public service matters.

The United States Civil Service Commission announces examinations June 7 for the position of junior architect in the division of valuation, Interstate Commerce Commission; salary, $1,200 to $1,680. Applicants must be between 21 and 36 years of age.

In addition to increases in the pay of station men and other employees, as noted in a recent issue of the *Railway Age Gazette*, the Chicago & North Western has recently given increases in pay averaging about $5 a month to all employees in its general offices, receiving less than $110 a month, with a few exceptions.

The address of Fairfax Harrison, president of the Southern Railway, delivered by him in presenting the recently announced service medals to old employees, has been printed in pamphlet form; and in connection with the address there is a list, filling 33 pages, of the names of these employees, showing the year in which each entered the service.

Gasolene motor car service is to be introduced in Cuba shortly by the Jucaro & Moron Railway on its line between Jucaro and Morón, a distance of about 40 miles. The steam trains at present being operated on this road will be discontinued upon the introduction of the motor cars, which have been ordered from the McKeen Motor Car Company, Omaha, Neb.

Press despatches from Sudbury, Ont., April 24, report disastrous floods in the Vermillion and Spanish rivers, with serious damage to the property of the Canadian Pacific and the Algoma Central railways, with interruption of traffic. At Whitefish the track of the Canadian Pacific was washed away and with it a locomotive and a caboose; and two men were drowned. In another accident, four railroad employees were drowned.

F. D. Underwood, president of the Erie, has announced that any employee of the road who is called upon for military duty of any kind in the militia (National Guard) shall enjoy leave of absence at full pay, such free time off to be in addition to regular vacation periods and not affecting continuous service credits. This order affects all employees who are paid salaries by the day, week, or month, but not those compensated by the piece, by the hour, or by mileage, such as the trainmen, which latter class, however, are not represented in any considerable number in the militia.

The Bureau of Foreign and Domestic Commerce of the Department of Commerce plans to hold an examination during the month of May for the position of special agent to investigate the markets of Africa, Australasia, and the Far East for railway supplies. The salary of an appointee to this position will not exceed $10 a day for each day in the year; actual transportation expenses and an allowance for actual subsistence expenses not to exceed $5 per diem will be paid. Application to take this examination should be made direct to the Bureau of Foreign and Domestic Commerce, Washington, D. C., and should set forth the applicant's education, and his experience in the subject of the investigation. A similar examination, also to be held in May, was announced last week for the position of special agent to investigate the markets of South America for railway supplies.

In the latter part of February the dining car and hotel department of the Union Pacific at Ogden, Utah, engaged a man named Osborne S. Harris as porter for its employees' club at Glenns Ferry, Idaho. He was furnished with a trip pass from Ogden to Glenns Ferry, limited to three days. He signed the pass in the superintendent's office, and instead of using it himself sold it for $2 to a young man 18 years of age. The latter used the pass and applied for the position for which Harris had been engaged, and for which the transportation was issued. The matter was placed in the hands of the Union Pacific legal department, Harris was arrested and pleaded guilty before the federal judge at Salt Lake City, and was sentenced to pay a fine of $100. As he was unable to pay his fine he was sent to the county jail. The young man who bought the pass was not prosecuted.

Fires

The freight house of the Southern Pacific at Eagle Pass, Tex., was destroyed by fire April 18, together with 20 box cars. Estimated loss, including several dwelling houses, $100,000.

The general office building of the Southern Railway, at Pennsylvania avenue and Thirteenth street, Washington, D. C., was badly damaged by fire on the night of April 23; estimated loss $200,000.

There was a disastrous fire at the Maybrook (N. Y.) freight terminal of the Central New England, 27 miles west of Poughkeepsie, on April 26, destroying two large freight houses and 70 loaded freight cars. Estimated loss, $400,000.

By an explosion of acetylene gas tanks in the yards of the Canadian Northern at Fort Rouge, Man., on April 20, a number of passenger cars and several buildings were destroyed by fire and seven men were injured. The loss from the fire and from the explosion was estimated at $100,000.

Meeting to Arrange Conferences With Train Employees' Brotherhoods

J. W. Higgins, executive secretary of the Association of Western Railways, Chicago; J. G. Walber, secretary of the Conference Committee of Managers for Eastern Territory, New York, and Charles P. Neill, manager of the Bureau of Information of the Southeastern Railroads, Washington, D. C., were to meet in Chicago on Thursday with committees representing the Brotherhood of Locomotive Engineers, the Brotherhood of Locomotive Firemen and Enginemen, the Brotherhood of Railroad Trainmen and the Order of Railway Conductors, to arrange the time and place for conferences between a conference committee, representing all the railroads of the United States, and representatives of the brotherhoods to discuss the demands which have been presented for the eight-hour basic day and time and one-half for overtime.

Chamber of Commerce Referendum on Railroad Wages Question

The directors of the Chamber of Commerce of the United States, at a meeting in Washington, April 25, ordered a referendum taken at once on a proposal to ask Congress to call upon the Interstate Commerce Commission to investigate at once all of the facts bearing on the demands of railroad employees for increased pay. Harry A. Wheeler, of Chicago, is chairman of the special committee of the chamber having this matter in hand. The result of the referendum will be known about June 10. The proposed resolution would direct the commission to go thoroughly into the question of minimum, maximum and average wages paid, with hours of service to each class of railroad employees, and so far as they are comparable, the minimum, maximum and averages paid in other industries where similar skill and risk are involved, the relation of wages to railroad revenues, and the question of whether railroad revenues based on existing rates for transportation will admit of equally favorable terms to all classes of railroad employees.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1916

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance of										
		Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Alabama & Vicksburg	143	$97,649	$28,732	$139,804	$15,539	$29,075	$3,620	$48,553	$1,796	$5,570	$104,154	$35,650	$8,535	$27,115	$36,124
Alabama Great Southern	309	309,285	80,651	430,159	42,558	108,348	13,615	129,000	2,611	8,347	304,479	125,681	17,868	107,798	34,179
Ann Arbor	294	153,188	35,218	200,601	11,916	32,049	4,572	80,580	295	11,925	141,337	59,264	15,970	43,123	16,841
Arizona Eastern	378	229,850	33,164	278,067	75,718	34,895	2,262	63,962	1,816	10,205	188,812	89,255	16,200	73,021	40,087
Atchison, Topeka & Santa Fe	8,620	6,173,413	1,934,218	8,906,659	1,171,285	1,452,505	185,061	2,465,056	.....	187,513	5,456,752	3,449,907	514,384	2,934,312	685,900
Atlanta & West Point	93	63,210	35,403	112,543	15,137	20,969	6,322	34,959	1,939	4,660	83,987	28,556	6,564	21,509	5,601
Atlanta, Birmingham & Atlantic	640	191,771	33,973	244,430	38,742	45,079	12,727	95,553	28	9,233	201,353	43,077	13,100	29,977	.....
Atlantic & St. Lawrence	167	160,420	14,874	185,039	19,562	26,663	4,224	91,277	.....	6,018	147,743	37,296	11,505	25,789	30,609
Atlantic City	170	72,776	48,851	129,046	29,815	16,947	3,300	82,383	97	907	133,449	—4,403	10,000	—14,403	19,806
Atlantic Coast Line	4,700	2,180,463	896,451	3,348,308	368,070	461,237	62,313	1,003,124	18,406	71,633	1,983,263	1,365,044	163,000	1,201,628	419,014
Baltimore & Ohio	4,535	6,715,433	982,910	8,325,177	864,535	1,969,860	150,830	3,136,394	60,876	206,372	6,388,539	1,936,638	320,401	1,618,694	50,363
Baltimore & Ohio Chicago Terminal	79	.....	430	139,674	8,788	19,499	903	78,846	1,225	7,402	115,957	23,718	18,638	5,068	—15,646
Baltimore, Chesapeake & Atlantic	88	37,218	15,434	54,971	4,774	12,088	971	37,397	.....	2,366	57,587	—2,616	2,243	—4,860	2,773
Bangor & Aroostook	632	269,130	40,811	325,761	43,603	51,248	2,816	100,199	2,679	11,197	211,731	114,030	13,400	100,623	—32,032
Belt Ry. Co. of Chicago	31	.....	.....	247,210	13,123	37,434	1,809	116,400	.....	5,198	173,965	73,245	14,015	59,231	—32,833
Bessemer & Lake Erie	205	430,889	23,401	471,821	47,447	165,929	8,688	173,434	.....	13,654	393,453	78,368	22,005	56,361	161,250
Bingham & Garfield	27	139,633	3,918	146,360	16,514	16,303	891	21,990	73	2,483	58,253	88,107	3,914	84,193	22,401
Boston & Maine	2,302	2,650,834	1,000,143	4,023,019	396,145	552,211	26,392	1,894,278	14,426	95,447	2,978,897	1,044,122	159,428	884,694	392,875
Buffalo & Susquehanna R. R. Corporation	253	145,635	6,046	153,704	18,040	37,246	1,055	42,317	.....	5,643	104,302	49,401	2,600	46,800	35,659
Buffalo, Rochester & Pittsburgh	586	844,810	78,276	951,794	74,676	219,346	11,647	345,610	1,342	22,126	674,747	277,047	20,000	256,998	106,961
Canadian Pacific Lines in Maine	233	227,328	12,985	254,147	13,800	27,914	4,920	97,518	.....	4,371	148,524	105,623	12,000	93,623	63,652
Carolina, Clinchfield & Ohio	283	238,449	14,428	258,256	25,086	35,085	13,109	50,602	.....	10,525	133,405	124,851	14,250	110,597	53,531
Carolina, Clinchfield & Ohio of S. C.	18	14,912	1,052	16,498	1,569	82	2,154	2,843	.....	780	7,327	9,170	750	8,420	4,650
Central of Georgia	1,924	678,275	228,168	1,006,964	150,401	174,696	35,866	333,470	2,198	35,560	731,795	275,169	52,418	222,399	22,620
Central of New Jersey	681	1,970,367	404,969	2,562,914	239,884	442,921	25,606	1,022,220	11,469	65,129	1,807,229	755,685	139,299	616,379	309,556
Central New England	304	327,941	27,726	373,432	30,513	39,548	1,010	135,888	.....	5,287	212,211	161,221	14,800	146,421	37,153
Central Vermont	411	245,657	56,625	233,507	23,589	51,336	7,032	163,804	2,559	7,434	255,753	77,753	15,640	62,105	53,344
Charleston & Western Carolina	343	125,477	22,861	156,929	25,728	18,269	3,585	51,076	.....	4,733	103,392	53,537	5,000	48,443	25,107
Chesapeake & Ohio Lines	2,374	3,159,445	389,686	3,848,576	421,739	962,477	54,565	1,183,273	25,576	75,379	2,721,512	1,127,065	130,000	996,961	311,089
Chicago & Alton	1,052	963,201	272,975	1,344,563	120,732	280,990	36,740	472,040	9,028	29,486	951,561	393,002	44,484	347,795	287,131
Chicago & Eastern Illinois	1,282	1,114,986	215,920	1,452,246	153,084	368,954	26,777	539,336	8,895	37,517	1,132,277	319,969	63,000	255,001	109,689
Chicago & Erie	270	572,456	37,999	664,966	47,702	63,079	17,080	259,068	2,078	13,863	402,809	262,157	22,230	239,927	126,243
Chicago & North Western	8,108	4,825,831	1,513,728	7,018,787	554,379	1,185,446	107,502	2,810,819	50,069	151,942	4,850,934	2,167,853	385,000	1,782,557	617,208
Chicago, Burlington & Quincy	9,369	6,039,273	1,468,916	8,249,314	483,361	1,328,475	118,861	2,640,473	79,747	163,057	4,813,973	3,435,340	367,160	3,068,181	1,457,811
Chicago Great Western	1,496	915,292	240,924	1,254,264	105,676	188,833	43,526	494,762	8,355	34,419	874,775	379,489	45,744	332,687	172,596
Chicago, Indianapolis & Louisville	622	415,443	130,705	593,135	54,825	101,437	18,889	214,671	301	17,582	407,458	185,677	27,030	158,619	21,639
Chicago Junction	13	.....	.....	190,074	22,393	18,820	1,240	117,972	.....	5,089	165,514	24,560	1,880	22,679	15,930
Chicago, Milwaukee & St. Paul	10,193	5,573,643	1,249,234	7,699,230	629,868	1,452,782	153,040	3,382,867	55,733	167,120	5,820,467	1,878,762	413,423	1,461,080	553,760
Chicago, Peoria & St. Louis	255	116,548	21,023	144,618	19,139	31,096	5,639	60,274	.....	5,233	.....	.....	.....	.....	.....
Chicago, Rock Island & Gulf	477	179,227	44,577	245,720	39,777	31,272	10,822	85,156	910	8,964	176,857	68,863	10,000	58,641	14,369
Chicago, Rock Island & Pacific	7,663	4,020,710	1,268,321	5,748,781	667,882	973,919	128,698	2,188,500	37,675	150,641	1,145,766	1,603,015	299,087	1,302,484	293,538
Chicago, St. Paul, Minn. & Omaha	1,753	1,020,909	357,557	1,488,460	119,564	199,218	26,741	686,520	15,488	39,321	1,086,670	401,789	80,286	321,431	54,140
Chicago, Terre Haute & Southeastern	373	230,159	15,814	251,833	23,689	52,131	4,097	81,400	1,612	8,401	171,329	80,504	10,417	70,087	34,689
Cincinnati, Hamilton & Dayton	622	535,795	78,373	672,247	79,586	180,839	13,371	252,391	2,789	17,361	544,805	127,442	27,787	99,623	132,312
Cincinnati, Indianapolis & Western	322	106,338	36,276	158,812	15,030	23,483	5,872	72,526	427	7,771	124,679	34,134	9,638	24,495	.....
Cincinnati, New Orleans & Texas Pacific	337	730,459	161,226	943,989	91,712	228,553	25,495	262,248	6,622	22,989	637,619	306,370	32,000	274,366	101,840
Cincinnati Northern	246	119,084	14,798	138,921	21,587	26,256	2,768	47,526	.....	2,594	100,730	38,190	6,000	32,190	18,674
Cleveland, Cincinnati, Chic. & St. Louis	2,385	2,684,366	657,421	3,640,765	296,830	688,878	72,850	1,282,243	23,180	69,729	2,428,119	1,212,646	135,000	1,077,384	801,416
Colorado Midland	338	89,594	6,419	106,257	15,676	30,784	6,633	49,839	669	5,225	108,826	—2,569	6,800	—9,369	—4,854
Colorado & Southern	1,102	532.308	84,969	666,806	67,183	133,342	8,363	196,859	3,232	22,683	431,662	235,144	35,000	200,136	107,322
Cripple Creek & Colorado Springs	87	90,232	12,803	104,743	10,548	11,302	2,600	26,343	.....	3,236	54,029	50,714	4,393	46,321	.....
Cumberland Valley	164	238,782	45,296	296,791	21,308	24,754	4,119	87,248	1,143	7,414	144,838	151,953	5,960	145,993	91,589
Delaware & Hudson Co.—R. R. Dept.	886	1,836,157	178,899	2,125,265	174,562	362,816	23,887	769,644	18,348	73,570	1,422,092	703,174	58,650	644,523	426,808
Delaware, Lackawanna & Western	955	2,923.542	581,167	3,873,898	198,902	635,447	66,916	1,355,805	28,213	80,872	2,365,183	1,508,715	202,500	1,306,199	616,592
Denver & Rio Grande	2,566	1,392,775	220,638	1,733,639	130,992	318,522	37,867	522,246	19.408	48,129	1,077,163	656,476	92,000	564,297	268,465
Denver & Salt Lake	255	122,098	14,004	143,018	18,456	43,012	1,615	65,196	.....	4,617	132,896	10,122	7,005	3,117	5,707
Detroit & Mackinac	397	64.891	19,113	90,316	8,859	18,190	1,726	35,035	.....	2,472	66,282	24,033	8,001	16,032	6,388
Detroit & Toledo Shore Line	81	159,490	.....	161,043	10,554	8,258	1,531	45,113	.....	2,664	68,120	92,923	5,941	86,982	30,607
Detroit, Grand Haven & Milwaukee	191	176.000	40,000	245,315	32,624	45,213	5,110	122,544	558	4,547	210,596	34,717	3,770	30,683	29,911
Detroit, Toledo & Ironton	441	157.524	11,492	179,667	20,302	22,088	3,777	91,663	.....	5,857	143,687	35,980	6,000	29,980	34,727
Duluth & Iron Range	288	74,635	20,769	102,747	41,345	58,714	1,026	72,363	1,756	8,199	183,404	—80,657	5,259	—85,916	—43,489
Duluth, Missabe & Northern	399	89,734	26,293	129,598	103,615	85,669	3,163	93,184	1,091	11,894	298.616	—169,018	6,662	—175,681	105,039
Duluth, South Shore & Atlantic	630	186,386	52,320	256,386	33,452	36,501	7,828	110,230	3,079	8,991	200,081	56,304	19,000	37,226	18,331
Duluth, Winnipeg & Pacific	187	162,628	19,681	186,497	9,809	17,382	1,678	86,858	687	6,794	123,208	63,289	9,325	53,964	10,383
El Paso & Southwestern Co	1,027	718,540	116,297	880,496	97,373	113,302	18,483	208,128	6,307	26,250	469,843	410,653	37,329	373,324	223,259
Elgin, Joliet & Eastern	791	1,069,089	7	1,138,547	74,072	247,726	6,369	347,194	.....	20,324	695,627	442,921	41,500	401,421	257,377
Erie	1,988	3,977,539	618,615	5,095,089	380,074	1,134,974	90,563	2,067,596	31,324	107,187	3,811,598	1,283,491	194,177	1,088,964	392,438
Florida East Coast	745	388,870	350,704	824,531	63,478	68,919	9,928	191,071	3,938	18,088	353,672	470,859	25,627	445,216	188,685
Fort Worth & Denver City	454	357,428	97,571	478,804	42,240	76,206	6,251	144,051	2,234	16,347	287,330	191,475	15,217	176,258	84,867
Galveston, Harrisburg & San Antonio	1,351	680,722	198,180	956,751	162,937	136,742	30,971	423,798	10,112	30,634	790,448	166,303	48,502	116,688	31,527
Galveston Wharf	13	.....	.....	122,397	2,233	2,244	333	32,794	27,477	370	65.451	56,946	10,000	46,946	—31,770
Georgia	307	169,486	55.795	245,842	21,332	40,146	11,703	107,383	83	7,252	187,762	58,080	4,865	52,850	36,750
Georgia, Southern & Florida	395	132,723	56.440	218,757	22,733	39,757	6,839	81,930	1,169	8,386	160,799	57,958	12,138	45,684	45,081
Grand Rapids & Indiana	575	317,533	87,672	431,985	53,993	87,659	9,661	192,250	371	16,322	360,256	71,730	23,929	49,801	27,248

Railway Signal Association

The regular meeting of this association will be held in New York City, at the Hotel Astor, Broadway and Forty-fourth street, on Wednesday and Thursday, May 24 and 25. Sessions are scheduled for morning and afternoon both days. The program for Wednesday includes reports of committees 1, 2 and 4, and that of the special committee on electrical testing; also a discussion on the analytical method of solving track circuit problems. On Thursday the association will discuss reports of committees 3, 4 and 9, and that of the special committee on harmonizing of specifications. Committee 1 will report on signaling practice; on revised requisites for switch indicators, and on the question of the capacity of a single track railway. Committee 2 will report on mechanical interlocking specifications, revised; new specifications for electro-mechanical interlocking, and on two drawings of leadaways, revised.

Committee 3 will report typical circuit plans for electro-pneumatic interlocking and specifications for petroleum asphaltum (revised). Committee 4 will report specifications for capping and grooved trunking (revised). Committee 6 will report six standard designs, namely: drawing 1107, foundations for ground-mast signal; drawing 1194, mechanical semaphore bearing (revised); drawing 1227, battery elevators (revised); drawing 1239, foundation for ground-mast mechanism signals; drawing 1359, three cell elevator; drawing, 1387, sub-base for bottom mast mechanism case.

Committee 9 will report specifications for friction tape, and for rubber insulating tape. The special committee on electrical testing will present a preliminary report on standard marking or numbering of relay posts. The special committee on harmonizing of specifications will discuss the details of general electrical requirements. The analytical method of solving track circuit problems will be the subject of a paper by C. F. Estwick.

Association of Railway Claim Agents

The twenty-seventh annual convention of the Association of Railway Claim Agents will be held at the Hotel Traymore, Atlantic City, May 17 to 19. The subjects to be discussed at the meeting are as follows:

The Federal Employers' Liability Act; address by Theodore W. Reath, general solicitor, Norfolk & Western.

Prevention of Accidents; R. C. Richards, general claim agent, Chicago & North Western.

The Handling of Claims of Railway Postal Clerks. To What Extent Would It be Advisable for Railways to Bring to the notice of the Government Cases of Malingering; How Can We Induce the Government to Take Action; Frank Wenter, Jr., general claim agent, Chicago, St. Paul, Minneapolis & Omaha.

The Ardmore Explosion; Jno. S. Douglass, general claim agent, Gulf, Colorado & Santa Fe.

Claim Economics; Frank V. Whiting, general claims attorney, New York Central.

Close Co-operation of Claim Department and Operating Department in the Investigation and Settlement of Claims; E. W. Sprague, assistant general claim agent, Yazoo & Mississippi Valley.

How Best to Cope with the Ambulance-Chasing Lawyer and Damage-Suit Doctor; W. L. Alexander, general claim agent, Missouri, Kansas & Texas.

The Association's annual banquet will be held Thursday evening, May 18.

The June Conventions

Oscar F. Ostby, president of the Railway Supply Manufacturers' Association, has named the following as members of the nominating committee: George M. Basford, Locomotive Pulverized Fuel Company, New York; Charles C. Pierce, General Electric Company, Boston, Mass.; B. E. D. Stafford, Flannery Bolt Company, Pittsburgh; Harry Frost, Frost Railway Supply Company, Detroit; L. F. Wilson, Bird-Archer Company, Chicago; George L. Morton, Galena Signal Oil Company, Atlanta, Ga., and Clarence H. Howard, Commonwealth Steel Company, St. Louis.

In addition to the officers, nominations will have to be submitted for five members of the executive committee. These will succeed in the first district: C. B. Yardley, Jr., Lubricating Metals Company, New York, and J. C. Currie, Nathan Manufacturing Company, New York, who are retiring members; in the third district, C. E. Postlethwaite, Pressed Steel Car Company, who retires on account of having moved from Pittsburgh to New York, or out of the district; in the fourth district, C. F. Elliott, Acme White Lead & Color Works, Detroit, whose term will have expired, and in the fifth district, Joseph H. Kuhns, Republic Rubber Company, Chicago, whose term also expires.

Railway Development Association

The annual meeting of the Railway Development Association is to be held in New Orleans, La., May 9, 10 and 11. This will be the first time that this association has held a meeting in the southern states and the governor of Louisiana, the mayor of New Orleans, and the dean of the Louisiana State University are named among the list of speakers. Other speakers are J. C. Clair (Illinois Central), R. W. Hockaday (M. K. & T.), James A. Hearn (New Orleans & N. E.), E. M. Williams (Southern Express Company), R. W. Cooke (Pennsylvania Lines), N. M. Leach (T. & P.), and J. W. Kearney (M. P.). On the evening of May 10, there will be a banquet, at which there will be speeches by the governor of Louisiana, and by T. C. Powell, vice-president of the Queen & Crescent.

The president of the association is John C. Emig (C. C. C. & St. L.), Cincinnati, and the secretary is H. O. Hartzell (B. & O.), Baltimore, Md.

American Railway Association

The spring session of the American Railway Association will be held at the Biltmore, Madison and Vanderbilt avenues, 43rd and 44th streets, New York, on Wednesday, May 11.

Reports will be presented by the following committees: the executive committee; the committee on transportation; the committee on maintenance; the joint committee on automatic train stops; the committee on relations between railroads; the commitee on the safe transportation of explosives and other dangerous articles; the committee on electrical working; the committee on legal and traffic relations; the special committee on prevention of accidents at grade crossings, and the committee on nominations.

American Railway Tool Foremen's Association

The next convention of the American Railway Tool Foremen's Association will be held at the Hotel Sherman, Chicago, August 24 to 26. The topics to be discussed at the meeting are as follows: Heat Treatment of Steel; Special Tools for Steel Car Repairs and Devices for Reclaiming Material; Special Tools and Devices for the Forge Shop; Emery Wheels as Applied to Locomotive Repairs, and Jigs and Devices for the Engine House.

New York Central Signal Employees

The fourth annual luncheon of the former members of the signal department of the New York Central, east of Buffalo, will be held at the Hotel Astor, New York, May 24.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AIR BRAKE ASSOCIATION.—F. M. Nellis, Room 3014, 165 Broadway, New York. Next convention, May, 2-5, 1916, Atlanta, Ga.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Next meeting, June 20-23, 1916, Cincinnati, O.

AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Next convention, May 22-24, 1916, Hotel Sherman, Chicago.

AMERICAN RAILWAY ASSOCIATION.—J. F. Fairbanks, general secretary, 75 Church St., New York. Spring session, May 17, The Biltmore, New York.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June 19, 1916, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesdays in month, except July and August, 220 W. 57th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, Rooms 1116-8, Woodward Bldg., Washington, D. C. Annual meeting, June 28, 1916, Hotel Statler, Detroit, Mich.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Semi-annual meeting with Master Car Builders' Association. Annual convention, October, 1916, Chicago.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—Willis H. Failing, Terminal Station, Central of New Jersey, Jersey City, N. J. Next meeting, May 17, 1916, Hotel Traymore, Atlantic City, N. J.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting, June 16, Hotel Denis, Atlantic City, N. J.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 20-22, 1916, St. Paul, Minn.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, June 27-28, Boston, Mass.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September, and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

CINCINNATI RAILWAY CLUB.—H. Boutet, Chief Interchange Inspector, Cin'ti Rys., 101 Carew Bldg., Cincinnati. Regular meetings, 2d Tuesday, February, May, September and November, Hotel Sinton, Cincinnati.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Traffic Manager, R. F. & P., Richmond, Va. Annual session, May 17, 1916, Washington, D. C.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month. Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—J. G. Crawford, 547 W. Jackson Blvd., Chicago. Annual meeting, May 15-18, Hotel Sherman, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 23-26, 1916, Hollenden Hotel, Cleveland, Ohio.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June 14, 1916, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Next meeting, May 24-25, Hotel Astor, New York. Next annual convention, September, 1916, Grand Hotel, Mackinac Island, Mich.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C, Collingwood, Ohio. Annual meeting, May 15-17, 1916, Hotel Statler, Detroit, Mich.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders' and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK.—Roy S. Bushy, Firemen's Bldg., Newark, N. J. Regular meetings, 1st Monday in month, except July and August. The Washington, 559 Broad St., Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen't Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June, 20, 1916, Toronto, Ont.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's Office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Grand Pacific Hotel, Chicago.

WESTERN SOCIETY OF ENGINEERS.—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The Louisville & Nashville has placed an embargo on all consignments of freight to the Eastern states—points east of Parkersburg, Pittsburgh and Buffalo. This is to aid in keeping the company's freight cars within its own immediate territory.

The Lehigh Valley announces the opening of freight service on the Great Lakes. The boats of the Lehigh Valley Transportation Company have already sailed from Buffalo, Chicago and Milwaukee.

The Pennsylvania Railroad announces that the Anchor Line, taking freight to points on the Great Lakes, and all places beyond, will be continued this season as in former years, arrangements for through billing having been made by the railroad company with the Great Lakes Transit Corporation, the new company which has bought the lake vessels formerly run by the railroads.

In the *Railway Age Gazette* of April 14, page 857, it was stated that the Kellum Coffee & Manufacturing Company, Kansas City, which was indicted by the federal grand jury for misbilling shipments, had pleaded guilty in the United States district court. Instead of pleading guilty, as stated, the defendant entered a plea of nolo contendere, and was fined $25 on each of 10 counts.

Passengers who go to Alaska on the Grand Trunk Pacific steamships this summer will be "personally conducted"; that is to say, the company will send an "official courier" on each steamship, who will explain points of interest along the route, give short and breezy sketches of the history of the settlement and development of the country, relate legends and folklore of the Indian tribes of the coast, and show the glaciers and all the special beauty spots.

By tariffs which went into effect on April 15, the rates on coal to points on Lake Erie, and also to points in the Western states, from Avella, Pa., on the Wabash-Pittsburgh Terminal, 31 miles west of Pittsburgh, will be 10 cents a ton less than heretofore. This reduction is made by the Wabash-Pittsburgh Terminal and the Pennsylvania Lines, on shipments by way of Bridgeville, Pa., and it puts the Avella district on a par with the other mines in the Pittsburgh district producing the same grade of coal.

The New York State Public Service Commission, Second district, has again suspended for 30 days more the tariffs of the New York Central, increasing certain local passenger rates to the basis of 2½ cents a mile. The railroad company, in furnishing the data called for by the commission in this inquiry, has employed clerical labor equivalent to the work of six men for two years, and the papers presented at Albany made a bunch weighing 100 lb. Opponents have been given until May 8 to file their final briefs.

The United States Department of Agriculture announces that the government egg car—the department's refrigerating plant on wheels—is to make a demonstration tour through northern Indiana on an itinerary covering two months, from May 1 to July 1. The route will be over the lines of the New York Central, the Lake Erie & Western, and the Cleveland, Cincinnati, Chicago & St. Louis. Instruction will be given in the candling, packing, and chilling of eggs, also in the proper handling and marketing of dressed poultry.

On April 16 the Chicago & North Western improved its service between Chicago, Milwaukee and Mankato, Minn., and intermediate points by putting on a new steel electric-lighted train called the Rochester-Mankato Special. The train leaves Chicago daily at 6 p. m., and arrives at Mankato at 10 a. m. Returning, it leaves Mankato at 6:30 p. m., and arrives at Chicago at 9 a. m. On the same day a new all-steel electric-lighted train, the Sioux City-Chicago Special, was put in service between Chicago and Sioux City.

To promote the sale of southern made goods in the South American countries, the Southern Railway is to send its South American agent, C. L. Chandler, on a tour through South

America this summer. While on this trip his services will be at the disposal of Southern firms who desire to have specific trade opportunities investigated for them, and will also be glad to assist and promote their trade. There is a particularly good market for Southern cotton goods in Argentine and Uruguay at the present time.

The New York, New Haven & Hartford this week, Thursday, again anounced an embargo on all bituminous and anthracite coal, and on lumber and cement to certain places. The rule recently adopted, to accept these commodities in limited quantities, has not proved successful, and there is again a blockade. Embargoes have also been placed on a large number of other commodities, moving in smaller volume. Since the establishment of the conference committee at New York city, the number of cars waiting on other lines to be delivered to the New Haven has been reduced from 25,000 to 9,000.

At the hearing before the Interstate Commerce Commission at Washington, this week, when, at the request of merchants of Spokane, the commission reopened the Intermountain freight rate cases, the steamship men said that the reopening of the Panama canal would have little or no effect on freight rates between the Atlantic and Pacific coasts of the United States, for the reason that the vessels which formerly took freight through the canal have now been placed by their owners on other routes. The transportation of freight between America and Europe is now so profitable that the canal traffic is pretty sure to be neglected for a long time, probably a year or two. The Intermountain people now ask the commission to disapprove the very low rates made by the trans-continental railroads on certain commodities from the Pacific coast eastward, the competition of the canal, one of the principal reasons for making the low rates, having become inoperative. At the same time merchants in New York city and in the Pacific coast cities protest against any disturbance of the very low rates now prevailing.

The Two-Dollar Demurrage Rate

It appears that the recent order of the West Virginia Public Service Commission, allowing carriers to increase their charge for demurrage on freight cars from $1 a day to $2 a day, heretofore reported inaccurately, allows the higher rate only after the expiration of 5 days—2 days free time and 3 days at $1 a day. The West Virginia order, as well as those which have been issued by other states, corresponds substantially to that of the Interstate Commerce Commission, noticed in the *Railway Age Gazette* of April 7, page 811. Under all of these orders the time during which the higher rate is to be collected expires June 15. Among the state commissions that have issued these time-limited demurrage orders are those of New York, Pennsylvania, Maryland and Indiana. Others have held hearings. The Louisiana commission held a hearing this week.

"Sunset-Central" Now "Southern Pacific Lines"

The Texas Railroad Commission has been advised that the Southern Pacific Company will discontinue the use of the name Sunset-Central Lines as the official designation of its group of railroads in Texas and that hereafter these roads will be known as the Southern Pacific Lines. This group is composed of the Houston & Texas Central, the Galveston, Harrisburg & San Antonio, the Texas & New Orleans, the Houston, East & West Texas, and the Houston & Shreveport. The Southern Pacific is understood to be contemplating also a similar change in the term "Sunset-Central Lines" as applied to its lines in Louisiana, including Morgan's Louisiana & Texas, the Louisiana Western, the Iberia & Vermillion and the Lake Charles & Northern. The reason given for making the change is that the compound word, Sunset-Central, is confusing and misleading, and does not bear a close enough relation to the name of the Southern Pacific itself.

THE VICTORIAN RAILWAY COMMISSION has placed in the road its first supply of 100-lb. rails from the Broken Hill Proprietary, Limited (a home company). The commissioners are of the opinion that as regards workmanship, chemical composition and physical tests the rails compare favorably with any which have been received from America and elsewhere.—*The Engineer, London.*

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Coal to the Maryland-Delaware Peninsula

In re bituminous coal from points on the Pennsylvania and its connections. Opinion by the commission:

An application for authority to establish rates on bituminous and cannel coal from points on the Pennsylvania and its connections to water competitive points on the Maryland-Delaware peninsula lower than rates on like traffic to intermediate points is denied. (38 I. C. C., 658.)

Complaint Dismissed

Hudson Motor Car Company v. Pennsylvania Railroad et al. Opinion by the commission:

A third-class rating on storage batteries in carloads from Philadelphia to Detroit is not shown to be unreasonable or discriminatory. (38 I. C. C., 571.)

Class Rates to Sioux Falls

Traffic Bureau of Sioux Falls Commercial Club v. Great Northern et al. Opinion by the commission:

The class rates charged by the Great Northern and the Chicago, St. Paul, Minneapolis & Omaha from Duluth, Minn., and Superior, Wis., to Sioux Falls, S. D., are not found unreasonable or discriminatory. These rates apply both on local traffic and on rail lake and rail traffic moving through these ports from points east thereof. (38 I. C. C., 531.)

Rates on Condensed Milk

Hires' Condensed Milk Company et al. v. Pennsylvania Railroad et al. Opinion by Commissioner McChord:

Less-than-carload and carload rates applicable under official classification on condensed and evaporated milk (liquid) in cans, boxed, are held unreasonable, and rates no higher than Rule 26, less than carload, and fifth-class with 36,000-lb. minimum, carload, are prescribed for the future. The commission sees no reason for departing from the conclusions announced in Whiteland Canning Company v. P. C., C. & St. L., 22 I. C. C., 261, or for holding that condensed or evaporated milk, a food product, should take a higher rate than other food products shipped under the same circumstances and of the same value. Reparation awarded on less than carload shipments. (38 I. C. C., 441.)

Rates to Fredericksburg, Richmond and Petersburg, Va.

Chamber of Commerce of Washington, D. C., et al. v. Pennsylvania Railroad et al. Opinion by Commissioner McChord:

The defendants publish commodity rates from New York and Philadelphia to Fredericksburg, Richmond and Petersburg, Va., which are considerably lower on most of the articles than the class rates under which like kinds of traffic move to Washington. Upon complaint against this arrangement by firms and individuals of Washington, the commission finds:

Defendants' application for authority under the fourth section to continue lower commodity rates to the Virginia points named than to Washington is denied. Defendants should establish a list of commodity rates from New York and other eastern points to Washington substantially similar to their commodity rates to the Virginia points named, on a reasonable basis lower than the class rates. The case is held open to afford the carriers an opportunity to readjust their commodity rates in accordance with the views herein expressed. (38 I. C. C., 593.)

STATE COMMISSIONS

The Illinois Public Utilities Commission has ordered the railroads in the state to reduce their charge for cleaning and disinfecting stock cars from $2 for single-deck cars to 75 cents, and from $4 for double-deck cars to $1.25.

The Railroad Commission of Georgia has granted the application of the Wrightsville & Tennille to advance its freight

tariffs from the "Class C" basis to that called "Class D." The commission found that the present earnings of the company do not pay a reasonable return on the investment; and accepted the plea that if there could be no increase in income the passenger service of the road would have to be reduced.

PERSONNEL OF COMMISSIONS

Halford Erickson has tendered his resignation as chairman of the Wisconsin Railroad Commission, to take effect upon the selection of his successor. Mr. Erickson has been a member of the Wisconsin Railroad Commission since its organization in 1905. The resignation takes effect May 1. Mr. Erickson is to engage in private practice in Chicago, specializing in valuation, rate-making and financial work in the field of public utilities.

UNITED STATES SUPREME COURT

Safety Appliance Acts Applicable Though Employee Engaged in Intrastate Commerce

The Supreme Court of the United States on April 17 decided that the federal safety appliance acts apply to an interstate carrier, in remedial as well as in penal actions, irrespective of whether the employee was or was not employed in interstate commerce.

The plaintiff in this suit was engaged in the employ of the Texas & Pacific as a switchman in the company's yard at Marshall, Texas, in taking some bad-order cars to the shops. While descending from a car he fell owing to a defect in one of the rungs of the ladder, and was injured. The railroad insisted that the plaintiff was not under the protection of the federal acts because he was not coupling or uncoupling cars at the time, referring to section 4 of the act of 1893, which requires "secure grab irons or handholds in the ends and sides of each car for greater security to men in coupling and uncoupling cars." The court, however, pointed out that plaintiff's right was not based on that provision, but on section 2 of the amendment of 1910. "All cars requiring secure ladders and secure running boards shall be equipped with secure handholds or grab irons on their roofs at the tops of such ladders." The court held that this provision was intended for the especial protection of employees engaged in duties (braking on top of cars) such as that the plaintiff was performing.

It was also insisted that the plaintiff was not under the protection of the acts because at the time he was injured he was not engaged in interstate commerce; but the court held that the amendment of 1903 enlarged the scope of the original act so as to embrace all cars used on any railroad that is a highway of interstate commerce. The railroad company argued that this feature of this amendment (set forth in Southern v. U. S., 222 U. S., 20) only sustains the penal provisions of the act, and does not uphold a right of action by an employee injured through a violation of its provisions, unless he was engaged in interstate commerce. The court held that the scope of the legislation was broad enough to include all employees thus injured, irrespective of the character of the commerce in which they are engaged, since the title of the act, repeated in that of each supplement, is general: "An act to promote the safety of employees and travelers," etc.; and in the proviso to section 4 of the supplement of 1910 there is a reservation as to "liability in any remedial action for the death or injury of any railroad employee."

As the plaintiff's injury was directly attributable to a defect in an appliance which by the 1910 amendment was required to be secure, the act must therefore, it was held, be deemed to create a liability in his favor, unless it be beyond the power of Congress to create such a liability in favor of one not employed in interstate commerce. The doing of the plaintiff's work, and his security while doing it, could not be said to have been wholly unrelated to the safety of the main track as a highway of interstate commerce; for a failure to set the brakes on the cars being switched would have been obviously dangerous to main line movements. Perhaps upon the mere ground of the relation of his work to the immediate safety of the main track the plaintiff's right of action might have been sustained. But the court further held that there was no constitutional obstacle in the way of giving to the act in its remedial aspect as broad an application as was accorded to its penal provisions. The exclusion of persons injured in intrastate commerce from the benefit of a remedial action that is provided for persons similarly injured in interstate commerce is not required by anything in the Constitution. Remedial actions in behalf of intrastate employees and travelers must either be governed by the acts of Congress or else be left subject to regulation by the several states, with probable differences in the law material to its effect as regulatory of the conduct of the carrier. "We are therefore brought to the conclusion that the right of private action by an employee injured while engaged in duties unconnected with interstate commerce, but injured through a defect in a safety appliance required by the act of Congress to be made secure, has so intimate a relation to the operation of the act as a regulation of commerce between the states that it is within the constitutional grant of authority over that subject."

It was argued that the car was not in use in transportation at the time, and there could be no liability for injury to an employee who had notice of its bad condition, and was engaged in the very duty of taking it to the shop for repair. This, it was held, was sufficiently answered by the recent decision in Great Northern v. Otos, 239 U. S., 349, 351, where it was pointed out that, although section 4 of the act of 1910 relieves the carrier from the statutory penalties while a car is being hauled to the nearest available point for repairs, it expressly provides that it shall not be construed to relieve a carrier from liability in a remedial action for the death or injury of an employee caused by or in connection with the movement of a car with defective equipment. The question whether the defective condition of the ladder was due to the defendant's negligence was held to be immaterial, since the statute imposes an absolute and unqualified duty to maintain the appliance in secure condition. Judgment for the plaintiff was affirmed.—Texas & Pacific v. Rigsby. Decided April 17, 1916. Opinion by Mr. Justice Pitney.

COURT NEWS

The Illinois Supreme Court has rendered a decision fixing the valuation of the Illinois Central property in 1913 for purposes of taxation, at $191,020,034. The state auditor had brought suit against the road to compel it to pay taxes on a valuation of $365,559,000. The Illinois Central appealed the case and the court appointed a commissioner to take evidence. The company had placed the valuation at $189,185,593.

Eminent Domain—Valuation of Land

In proceedings by one railroad company to condemn for railroad purposes the land of another, the Pennsylvania Supreme Court holds that the fact that the latter had ceased to operate did not limit the damages to the value of the ground for agricultural purposes, but permitted recovery on the basis of its value by reason of its availability for the location of a railroad.—North Shore v. Pennsylvania Co. (Pa.), 96 Atl., 990.

Inconsistent Findings by Jury

In an action for wrongful death under the employers' liability act, the Kansas Supreme Court holds that a general verdict for the plaintiff must be set aside where the jury declared in one finding that the accident would have happened even if the deceased had not been negligent, and in another that his negligence contributed to it; no deduction from the amount allowed appearing to have been made on that account.—Pyles v. Atchison, T. & S. F. (Kan.), 155 Pac., 788.

Licensees on Rights of Way

The Chicago, Great Western had a wreck on its road in the city of Council Bluffs, near the intersection of two streets. One of the rails was thrown into a curved position, and held there for some hours by the strain of the wreckage. The wreck was at a point where the right of way had been used for many years for public travel. A child on the way to school went out of his accustomed path to look at the wreck. While passing the bent rail, it was suddenly relieved of its strain, and in straightening out injured the child. The Iowa Supreme Court holds that the child could not recover from the company as a licensee, for its negligence in leaving the rail in a dangerous position, on the

ground that he had formerly used the right of way to carry luncheon to his father, since he was not, at the time he was injured, so engaged.—Wilmes v. C. G. W. (Iowa), 156 N. W., 877.

Stopping Train for Person Discovered on Track

In an action against a railroad for a death on its track there was evidence that the engineer discovered the deceased sitting on the track while some distance away. On appeal from a judgment for the plaintiff, the Texas Court of Civil Appeals held that an instruction to the jury on discovered peril failing to state that the defendant was not required to stop its train until it was reasonably apparent to the engineer that the deceased probably could not or would not save himself was reversible error.—Gulf, Colorado & Santa Fe v. Phillips (Tex.), 183 S. W., 806.

Spike on Cross-Tie Causes Unforeseen Accident

For the purpose of double tracking its line, a railroad was negotiating with the owner of a farm for an additional strip of land. While the farmer and an adjuster of the company were walking along the track viewing the strip, the farmer stumbled against a spike protruding two inches from a tie midway between the rails, and fell, breaking his arm. In an action against the railroad, the Kentucky Court of Appeals held that the occurrence was one which the railroad could not have reasonably anticipated, and it was not liable for the injury.—Gosney v. L. & N. (Ky.), 183 S. W., 538.

Special Trains and Flag Stations

A railroad had for years run excursion trains at reduced rates on a state fair day through a certain station, stopping and taking on passengers there when flagged. Relying on this custom, an intending passenger flagged the train, which stopped; but the conductor refused to admit him as a passenger, because he had an order from the trainmaster to stop only at agency stations to take on passengers. This was not an agency station, and tickets could not be bought there. A regular train stopped daily each way. In an action for damages the Mississippi Supreme Court held that the company could change its rules and take on passengers on the special train at agency stations only.—Gulf & Ship Island v. Dixon (Miss.), 70 So., 898.

"Operating Through Train"

A municipal ordinance declared that it should be unlawful for any railroad company to run any through or local freight or passenger train through the municipality on a named street at a speed exceeding four miles an hour, and that the railroad should have a flagman proceed 50 feet in front of every through or local train to warn persons of the approach of the train. A bicyclist was struck by the tender of the engine of a through train which had set off cars from the train at that point, and was backing onto its train. The North Carolina Supreme Court held that as the dropping of the cars was part of the work of the through train, the engine and tender were part of that train, and were subject to the ordinance.—Dorsett v. A. C. L. (N. Car.), 87 S. E., 961.

Threat of Arrest Does Not Justify Jumping from Moving Train

In an action for damages for injuries following an alleged ejectment from a moving train, the plaintiff claimed he was threatened with arrest unless he alighted before the train reached a station, and was subsequently knocked or pushed from the train by a trainman. A trainman admitted he took a bottle of whisky from the passenger and threatened to have him arrested when the train reached the station for violating the law prohibiting drinking whisky on a train, but denied using force. It was shown that the passenger had a pistol in his pocket, and it was the theory of the railroad that he was afraid he would be arrested for carrying a pistol, and therefore jumped off the moving train. The Arkansas Supreme Court held that a mere threat to have him arrested, not accompanied by force or by a threat of immediate bodily harm, was not enough to justify the plaintiff in leaving the rapidly moving train.—St. Louis, I. M. & S. (Ark.), 183 S. W., 748.

Railway Officers

Executive, Financial, Legal and Accounting

Thomas H. Fittz has been appointed general claim agent of the Evansville & Indianapolis, with office at Terre Haute, Ind.

George H. Hess, Jr., has been appointed assistant controller of the Great Northern, with office at St. Paul, Minn., vice F. H. Parker, transferred.

S. R. Biering, freight claim auditor of the Gulf, Colorado & Santa Fe, has been promoted to assistant general claim agent, with headquarters at Galveston, Tex.

J. H. Conley, purchasing agent of the Georgia & Florida at Augusta, Ga., has been appointed auditor with office at Augusta, succeeding W. H. Alexander, resigned.

C. E. Ambler, transfer agent of the Louisville & Nashville at New York, has been appointed assistant treasurer and assistant secretary, with office at New York, vice E. L. Smithers, promoted.

Joseph S. Ford, auditor for the receivers of the Chicago & Eastern Illinois, with office at Chicago, will retire on May 1, after 48 years of continuous railroad service on western roads. He will, however, retain the office of treasurer of the Southern Illinois & Missouri Bridge Company.

Perry McCart, general attorney of the Chicago, Indianapolis & Louisville, has been appointed general solicitor, with office at Chicago, Ill., vice E. C. Field, deceased. C. C. Hine, assistant general attorney, has been appointed general attorney, succeeding Mr. McCart. Effective May 1.

Arthur Lee, who has been elected vice-president of the Coal & Coke Railway, with headquarters at Elkins, West Va., was born on May 7, 1864, at Richmond, Va., and was educated in Virginia Military Institute and the University of Virginia. He entered railway service in May, 1900, as treasurer of the West Virginia Central & Pittsburgh, now a part of the Western Maryland. He subsequently became vice-president of the Charleston, Clendennin & Sutton with headquarters at Elkins, W. Va., and later was appointed treasurer of its successor the Coal & Coke Railway. In 1908 he became second vice-president and treasurer, which position he held at the time of his recent election as vice-president of the same road, as above noted.

E. L. Smithers, assistant treasurer and assistant secretary of the Louisville & Nashville at New York, has been elected second vice-president, with headquarters at New York, in place of William J. Dickinson, deceased. Mr. Smithers was born on November 18, 1867, at St. Albans, England. He entered railway service in 1884 as junior clerk with the St. Louis & Cairo, now a part of the Mobile & Ohio, holding this position for two months. In 1885 he was for six months clerk in the freight office of the Chicago, Burlington & Quincy at Chicago, and later was clerk at Akron, Ohio, for the Cleveland, Akron & Columbus, now a part of the Pennsylvania Company. In 1886 he was appointed secretary to the president of the Louisville & Nashville at New York, filling this position for about four years, when he was made clerk in the treasurer's office. From May, 1901, to December, 1902, he was transfer agent, and then was appointed assistant secretary and assistant treasurer, which position he held at the time of his recent election as second vice-president of the same road as above noted.

Operating

R. W. Patterson has been appointed general superintendent of the Oklahoma, New Mexico & Pacific, with headquarters at Ardmore, Okla., vice W. J. Stone Burner, transferred.

C. E. Burchfield, trainmaster of the Southern Railway at Knoxville, Tenn., has been appointed superintendent of the Virginia & Southwestern, with headquarters at Bristol, Va.-Tenn., vice S. J. Mulvaney, transferred to service with the Southern Railway.

The headquarters of the Erie Lines West will be removed on May 1 from Cleveland, Ohio, to Youngstown. The officers now at Cleveland, whose headquarters will be removed to Youngstown, include J. B. Dickson, general manager, and F. G. Robbins, general superintendent.

S. J. Mulvaney, superintendent of the Virginia & Southwestern at Bristol, Tenn., has been appoined trainmaster of Asheville Terminal and Asheville-Hayne line of the Southern Railway, with headquarters at Asheville, N. C., and R. L. McCollough has been promoted to trainmaster of the Southern Railway, with headquarters at Knoxville, Tenn., vice C. E. Burchfield, promoted to service with the Virginia & Southwestern.

Theodore Speiden, Jr., superintendent of the Nashville and Chattanooga divisions of the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., has been appointed assistant general manager with headquarters at Nashville. F. W. Kelsey, assistant superintendent at Nashville, has been appointed superintendent of the Chattanooga division, and W. G. Templeton assistant superintendent at Nashville, has been appointed superintendent of the Nashville division.

F. B. Parry, trainmaster of the New Jersey & Lehigh division of the Lehigh Valley at Easton, Pa., has been appointed assistant superintendent of the Wyoming division with office at Wilkes-Barre, succeeding F. M. Barker, recently made superintendent. T. W. Brewer, assistant road foreman of engines at Easton has been appointed trainmaster succeeding Mr. Parry. J. H. Curry, trainmaster of the Seneca division at Sayre, Pa., has been appointed trainmaster of the New York division, with office at Jersey City, N. J., succeeding T. F. McCarthy, resigned to accept service elsewhere. R. L. Gebhardt, division engineer of the New Jersey & Lehigh division at Easton, succeeds Mr. Curry.

The Pennsylvania Railroad announces the following appointments in the operating department, to become effective May 1: F. L. Sheppard, general superintendent of the New Jersey division, has been appointed resident assistant to the vice-president in charge of operation. Elisha Lee, general superintendent of the Philadelphia, Baltimore & Washington, has been appointed assistant general manager. C. S. Krick, acting general superintendent of the New Jersey division, has been appointed general superintendent of the New Jersey division. Gamble Latrobe, general agent and superintendent at Baltimore, Md., has been appointed general superintendent of the Philadelphia, Baltimore & Washington. The New York and the Manhattan divisions will be consolidated into the New York division, and R. V. Massey, superintendent of the Manhattan division, will be superintendent of the New York division. F. W. Smith, Jr., division engineer of the New York division, has been appointed assistant superintendent of the New York division. George R. Sinnickson, superintendent of the Schuylkill division, has been appointed superintendent of the Baltimore division. J. J. Rhoads, superintendent of the Media division, has been appointed superintendent of the Schuylkill division. R. M. Patterson, superintendent of freight transportation, has been appointed special agent in the general manager's department. J. B. Fisher, superintendent of the New York division, has been appointed superintendent of freight transportation. H. C. Bixler, acting superintendent of the Philadelphia Terminal division, has been appointed superintendent of stations and transfers. J. H. Gumbes, superintendent of the Renovo division, has been appointed superintendent of the Philadelphia Terminal division. J. M. Jones, passenger trainmaster of the Philadelphia Terminal division, has been appointed assistant superintendent of the Philadelphia Terminal division. J. M. James, assistant superintendent of the Pittsburgh division, has been appointed superintendent of the Renovo division. J. M. Henry, superintendent of motive power of the Western Pennsylvania division, has been appointed assistant superintendent of the Pittsburgh division. It is further announced that the Baltimore division south of Wago, Pa., including the York branch of the York, Hanover & Frederick, and to the north side of Bayview Yard, will be the new Baltimore division and be attached to the Philadelphia, Baltimore & Washington. The Baltimore division north of Wago will be attached to the Eastern Pennsylvania division. The southern terminus of the Central division will be at Rockville, Pa.

Traffic

F. E. Middleton has been appointed district freight agent of the Union Pacific System, with office at Los Angeles, Cal.

E. M. Davis, division freight agent of the Baltimore & Ohio at Youngstown, Ohio, has been appointed assistant to general freight agent at Baltimore, Md., succeeding the late F. Fowler, effective May 1.

L. W. Price, general baggage agent of the St. Louis & San Francisco, has been appointed division passenger agent at Oklahoma City, Okla., vice C. O. Jackson. H. T. Mason, manager of mail traffic, has been appointed general baggage agent, vice Mr. Price. Effective May 1.

W. E. Chambers, assistant general freight agent of the Louisville, Henderson & St. Louis at Louisville, Ky., has been appointed general freight agent, and E. M. Womack, assistant general passenger agent at Louisville, has been appointed general passenger agent. The positions of assistant general freight agent and assistant general passenger agent have been abolished.

J. H. Rees, chief of tariff bureau of the Minneapolis, St. Paul & Sault Ste. Marie, has been promoted to assistant general freight agent, with office at Minneapolis, Minn. A. L. Preston, general agent, freight department at St. Paul, Minn., has been appointed assistant general freight agent, with office at Minneapolis. George T. Huey has been appointed general agent at St. Paul, vice Mr. Preston, promoted.

O. L. Anderson, general agent of the Macon, Dublin & Savannah at Dublin, Ga., has been appointed district freight and passenger agent, with office at Dublin, in charge of the territory in southeast Georgia, not including Dublin or Savannah proper. N. H. Rahn, commercial agent at Macon, succeeds Mr. Anderson, and George M. Norwood has been made commercial agent, with office at Macon, vice Mr. Rahn.

Engineering and Rolling Stock

W. S. Moore has been appointed engineer of maintenance of way of the Louisville, Henderson & St. Louis.

F. L. Wheaton, engineer of construction of the Delaware, Lackawanna & Western at Nicholson, Pa., has been appointed division engineer, with office at Binghamton, N. Y., vice C. E. Wickham, deceased.

John Merry, roadmaster on the Rocky Mountain division of the Northern Pacific with headquarters at Missoula, Mont., has been transferred to the Yellowstone division with office at Glendive, Mont.

Thomas Lewis, master mechanic of the Auburn division of the Lehigh Valley at Auburn, N. Y., has been appointed general boiler inspector for the system, with headquarters at Sayre, Pa. M. Jefferson, assistant master mechanic of the New Jersey and Lehigh division at Easton, Pa., succeeds Mr. Lewis.

J. H. Harris, division engineer of the Manhattan division of the Pennsylvania Railroad has been appointed division engineer of the new New York division. H. H. Maxfield, master mechanic of the Pittsburgh division, has been appointed superintendent of motive power of the Western Pennsylvania division.

J. F. Donovan, division engineer of the Mahoney & Hazleton division of the Lehigh Valley at Hazleton, Pa., has been appointed division engineer of the New Jersey & Lehigh division with office at Easton, succeeding R. L. Gebhardt, and C. R. Anderson, supervisor of the Mahanoy & Hazleton division, has been promoted to division engineer, succeeding Mr. Donovan.

OBITUARY

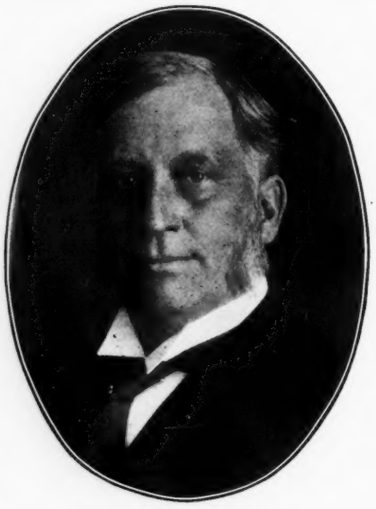
Colonel A. D. Davidson, formerly land commissioner of the Canadian Northern, died at Rochester, Minn., April 22.

E. J. O'Neill, general agent of the Chicago, Rock Island & Pacific at St. Louis, Mo., died at his home in that city on April 17.

Stephen Philip Kretzer, secretary and assistant treasurer of the Staten Island Rapid Transit Ry. at New York, died on April 23 at his home in Westfield, N. J., at the age of 66. Mr. Kretzer had been in the service of Baltimore & Ohio lines for 51 years.

Y. Van den Berg, president of the Aransas Harbor Terminal Railway, and chairman of the board of the Gulf Coast Lines, with offices at New York and at New Orleans, La., died suddenly on April 19 at the Manhattan Hotel, New York. Mr. Van den Berg was born at Amsterdam, Holland, and entered railway service in 1881. He had a wide circle of acquaintances in the railway traffic world, having been for seven years traffic manager of the Louisville & Nashville. From November, 1899, to April, 1901, he was first vice-president of that road. From June, 1904, to December, 1905, he served as assistant general freight agent of the Gulf, Colorado & Santa Fe and later became president of the Aransas Harbor Terminal Railway.

Joel Frederick Vaile, general counsel of the Denver & Rio Grande, whose death on April 3, at Pasadena, Cal., has been announced, was born at Centerville, Wayne County, Indiana, on March 14, 1848. He graduated from Oberlin College with the degree of A. B. in 1872, and was admitted to the bar in 1875. He was prosecuting attorney of the 36th judicial district of Indiana in 1878. He removed to Denver, Colo., in 1882, and entered the service of the Denver & Rio Grande, as attorney in 1885. He later became general attorney of the same railroad and in April, 1905, was promoted to general counsel, the position he retained up to the time of his death. He was also senior member of the law firm of Vaile, McAllister & Vaile and a member of the American Bar Association.



J. F. Vaile

William Henry McDoel, formerly president of the Chicago, Indianapolis & Louisville, died on April 25, at his home in Chicago. Mr. McDoel was born on March 28, 1841, at Goffstown, N. H., and began railway work in September, 1860. He served consecutively as check freight clerk, acting agent and agent of the Great Western Railway (of Illinois), and later became agent, and then general agent of the Toledo, Wabash & Western. In 1875 he was appointed western agent of the "Blue Line," and in 1878 he became general freight agent of the Hannibal & St. Joseph. He was then southwestern freight agent of the Chicago, Burlington & Quincy. In August, 1884, he was appointed general freight agent of the Louisville, New Albany & Chicago, and later served consecutively as traffic manager, general manager, also vice-president and receiver of the same road. In July, 1897, he became vice-president and general manager of the Chicago, Indianapolis & Louisville, successor to the Louisville, New Albany & Chicago. On April 25, 1899, he was elected president and general manager, and from January, 1906, to November, 1910, was president of the same road. He was also chairman of the Chicago & Ohio River Traffic Association from 1889 to 1890.

W. H. McDoel

Equipment and Supplies

LOCOMOTIVES

THE CUBA RAILROAD is inquiring for 4 six-wheel switching locomotives.

THE UNION RAILROAD is in the market for 2 switching locomotives.

THE ARKANSAS, LOUISIANA & GULF is inquiring for one ten-wheel locomotive.

THE DENVER & RIO GRANDE is inquiring for prices on 10 Santa Fe type locomotives.

THE MOGYANA RAILROAD of Brazil is inquiring for prices on 3 Pacific type locomotives.

THE MONONGAHELA CONNECTING has ordered one locomotive from the H. K. Porter Company.

THE ANN ARBOR is reported as inquiring for a number of six-wheel switching locomotives.

THE CANADIAN GOVERNMENT RAILWAYS are in the market for 25 locomotives for the Intercolonial Railway.

THE BUTTE, ANACONDA & PACIFIC has ordered 6 electric locomotives from the General Electric Company.

THE WABASH has withdrawn its inquiry for 25 Santa Fe type locomotives, mentioned in the *Railway Age Gazette* of April 7.

THE MUSCATINE & IOWA CITY, Muscatine, Iowa, is in the market for 4 second-hand locomotives for mixed passenger and freight service.

THE SEABOARD AIR LINE has issued inquiries for 10 Mountain type locomotives, and is understood to be contemplating the purchase of 15 Mallet type engines.

THE NORTHERN RAILWAY of Spain has issued inquiries in this country for 18 twelve-wheel (4-8-0) locomotives and for a number of 4-8-4 type and Mikado type locomotives.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for a second-hand 80 to 85-ton Mogul, Ten-wheel, or other type locomotive for passenger service.

THE SOUTHERN, reported in the *Railway Age Gazette* of April 14 as having ordered 25 Santa Fe and 15 Mountain type locomotives from the Baldwin Locomotive Works, has ordered 5 additional Santa Fe type locomotives from that company.

FREIGHT CARS

THE NEW YORK CENTRAL has issued inquiries for 2 well cars.

THE ILLINOIS CENTRAL has revived its inquiries for 300 all-wood stock cars.

THE CHICAGO, ROCK ISLAND & PACIFIC is in the market for 300 center constructions.

THE OCEAN SHORE RAILROAD is reported in the market for 20 flat and 30 gondola cars.

THE SAN PEDRO, LOS ANGELES & SALT LAKE is inquiring for 100 to 300 automobile cars.

THE FRENCH GOVERNMENT has issued inquiries in this country for 2,300 four-wheel box cars.

THE BRIER HILL STEEL COMPANY, Youngstown, Ohio, is inquiring for 30 50-ton hopper bottom coke cars.

THE LA BELLE IRON WORKS, Steubenville, Ohio, is reported in the market for 10 hopper and 5 tank cars.

FAIRBANKS, MORSE & CO., Chicago, are in the market for 10 standard gage all-steel box cars of 32 long tons' capacity for an oriental road.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for 10 second-hand low side hopper bottom steel gondola cars.

THE CARNEGIE STEEL COMPANY is inquiring for 80 coke, 30 gondola and 3 flat cars in addition to the cars mentioned in the *Railway Age Gazette* of March 31.

THE SOUTHERN RAILWAY, reported in the *Railway Age Gazette* of April 14 as having ordered 1,750 box cars from the American Car & Foundry Company, and 1,500 from the Mount Vernon Car Manufacturing Company, has also ordered 1,007 30-ton steel center sill box cars, 500 30-ton steel center sill automobile cars, and 100 caboose cars from the Lenoir Car Works.

PASSENGER CARS

THE SEABOARD AIR LINE has issued inquiries for 15 all-steel express cars.

THE ERIE has ordered 2 dining cars from the Barney & Smith Car Company.

THE COPPER RANGE RAILROAD is inquiring for 4 reinforcing underframes for postal cars.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for a good second-hand private car.

THE INDIANAPOLAS TRACTION & TERMINAL COMPANY has ordered 25 interurban cars from the Standard Steel Car Company.

IRON AND STEEL

THE VIRGINIAN RAILWAY has ordered 8,000 tons of rails from the Pennsylvania Steel Company.

THE WESTERN MARYLAND has ordered 2,000 tons of rails from the Pennsylvania Steel Company.

THE CHESAPEAKE & OHIO has ordered 10,000 tons of rails from the Pennsylvania Steel Company.

THE VIRGINIAN RAILWAY has ordered 115 tons of bridge work from the Virginia Bridge & Iron Works.

THE SEABOARD AIR LINE has ordered 160 tons of steel from the American Bridge Company for a shop at Howells, Ga.

THE MAINE CENTRAL has divided an order for 550 tons of bridge steel among the American Bridge Company and other shops.

THE MISSOURI PACIFIC has placed orders with the American Bridge Company for 234 tons of steel for three 90-ft. turntables, and 432 tons for various bridges.

THE CHICAGO, BURLINGTON & QUINCY has placed orders for 40,000 tons of rails in addition to the 20,000 tons noted in the *Railway Age Gazette* of March 24.

THE SOUTHERN RAILWAY has ordered 1,750 tons of bridge steel from the American Bridge Company, 500 tons from the Fort Pitt Bridge Works, and 450 tons from L. F. Shoemaker & Co.

THE PHILADELPHIA & READING has divided an order for 25,000 tons of 100-lb. rail for 1917 delivery among the Bethlehem Steel Company, the Carnegie Steel Company, the Lackawanna Steel Company and the Pennsylvania Steel Company.

MACHINERY AND TOOLS

THE INDIANA HARBOR BELT is inquiring for prices on one radial drill, one 36-in. lathe, one 24-in. lathe, one 16-in. lathe, one 1½-in. triple bolt cutter, one 1,500-lb. steam hammer, and one 42-in. boring mill. It expects to come into the market for additional tools in the near future.

NEW RAILWAY EQUIPMENT FOR VICTORIA.—Provision has been made in the railway bill recently read a second time in the Victorian legislature, for the construction of 77 country cars, 8 passenger vans, 36 suburban cars, 60 "A 2" engines, 1,000 15-ton goods trucks, 150 sheep trucks, 100 cattle trucks, 70 bogie goods trucks, 50 refrigerator trucks, 150 louvre trucks, 60 water trucks, 20 narrow-gage cattle trucks, and 40 vans.

Supply Trade News

The Signal Accessories Company will move its offices on May 1, from the fourth to the seventh floor of the Hudson Terminal building, 30 Church street, New York City.

The Hydraulic Press Manufacturing Company, Mount Gilead, Ohio, has opened a branch sales office at 416 Citizens' building, Cleveland, Ohio, in charge of Charles E. Newell.

The Goodyear Tire & Rubber Company, Akron, Ohio, will issue $10,000,000 of new preferred stock, the sale of which has already been underwritten. F. A. Seiberling, president, states that the company expects to double its production facilities within the next ten months.

Clifford J. Ellis, who has for many years been sales manager for the Cambria Steel Company at Chicago, has been appointed sales manager for the Midvale Steel Company, in charge of sales in that territory for the Midvale Steel Company, Cambria Steel Company and Worth Brothers Company in their combined relations.

C. H. Todd, former president of the Petroleum Iron Works Company, Sharon, Pa., and G. F. Wood-Smith, former president of the Pennsylvania Tank Car Company and the Pensylvania Tank Line Company, Sharon, Pa., allied interests, have purchased properties of the Masurite Explosive Company at Masury, Ohio, including 50 acres of land with buildings and machinery. Equipment will be installed for building tank cars, and the company also will engage in general plate work.

The first rail in the new department of the Edgar Thomson Steel Works of the Carnegie Steel Company at Bessemer, Pa., known as No. 2 rail mill was rolled at 7 p. m., April 22. This mill will roll 100 to 150 lb. sections. No. 1 mill rolls from 40 to 100 lb. and No. 3 mill rolls light rails from 16 to 40 lb. These three rail mills, when a full supply of steel can be obtained, could roll close to 1,500,000 tons of rails per year. The present ingot capacity of the Edgar Thomson works, however, is only 1,440,000 tons per year maximum, so that only about 1,200,000 tons of rails can be rolled.

R. W. Rost, salesman of the Goodyear Tire & Rubber Company with headquarters at Newark, N. J., has been promoted to manager of the Goodyear branch at Albany, N. Y., succeeding E. B. Sigerson, recently appointed manager of the Buffalo (N. Y.) branch. J. A. Leatherman, salesman at Portland, Ore., has been appointed manager of the sales office in that city. L. H. Vaughan, manager at Utica, N. Y., has been appointed manager of the branch at Newark, N. J. He is succeeded at Utica by F. G. Richards, who has been connected with the Newark office as salesman. R. S. Herman, salesman at Joplin, Mo., has been transferred to Salina, Kan., as manager of the Goodyear branch there.

The Iron Age of April 27 says that the purchase of the Canadian Car & Foundry Company's plant at Fort William, Ont., and its transfer to Russia, is sought by the representatives of the Russian government, and "all that remains to be done is the completion of an agreement between the company and the City Council of Fort William, before the deal is put through. This scheme is part of a plan by which the Russian authorities aim to increase the rolling stock of their railroads, in order that supplies and troops may be transported with greater facility. The plant was completed in 1914, but it was found impossible to start operations on account of the war. It is equipped with all machinery necessary for the manufacture of freight and passenger cars." The company's original plant is at Montreal.

The Universal Arch Company has been incorporated for the manufacture and sale of locomotive arch fire brick and other railway equipment. The company has established its general offices in the McCormick Building, Chicago, directly in charge of William Smith, president, formerly master mechanic of the New York Central, J. B. Kilpatrick, vice-president, formerly district mechanical superintendent of the Chicago, Rock Island & Pacific, and John H. Cavender, vice-president and treasurer.

The company has placed contracts with leading fire brick manufacturers. The board of directors of the company consists, in addition to Messrs. Smith and Kilpatrick, of the following: Robert A. B. Walsh, vice-president of the Mississippi Glass Company and vice-president and general manager of the Walsh Fire Clay Products Company; W. A. Stanton, vice-president of the General Refractories Company; H. E. Stuhler, secretary and treasurer of the Dover Fire Brick Company; C. W. Keller, general manager of the Hayes Run Fire Brick Company, and John H. Cavender, vice-president of the Chicago Retort & Fire Brick Company. The types of locomotive arch fire brick which the new company has placed upon the market have been passed upon and accepted by the Western Railroad Association.

Steel Corporation's Huge Quarterly Earnings

The net earnings of the United States Steel Corporation for the quarter ending March 31, after deducting operating and maintenance costs and interest on the bonds of subsidiary companies, amounted to $60,713,624, a new high record. The largest amount earned in any previous quarter was 51,237,788, in the last quarter of 1915. The earnings have been rising steadily month by month. In December, 1915, they were $17,677,966; in January, 1916, $18,794,912; February, $19,196,396, and in March, $22,722,316. The earnings for March are at the rate of $272,660,000 annually and exceeded even the most optimistic expectations. The net earnings of the corporation in 1907, its best previous year, were $160,964,674.

At the meeting of the directors on April 25, regular quarterly dividends of 1¾ per cent on the preferred and 1¼ per cent on the common stock were declared.

TRADE PUBLICATIONS

PULVERIZED FUEL.—The United Combustion Company, 30 Church street, New York, in its first bulletin issued under date of March 1 describes the company's pulverized fuel feeder for stationary service.

ACETYLENE.—The Searchlight Company, Chicago, has issued a folder taking up the question: Why it costs 50 per cent less to do a 100 per cent better job with *dry* acetylene than it does with *wet* acetylene, and why Searchlight acetylene is *dry*.

FOREIGN SPECIFICATIONS FOR RAILWAY MATERIAL.—With the object of placing in convenient and accessible form before those in the United States interested in or responsible for railway materials, the Bureau of Standards, Department of Commerce, in connection with its investigation of failures of railway material, has obtained, through the courtesy of the state department, copies of specifications for railway material—rails, axles, wheels, and tires—used in several European countries. These specifications are given in full, together with a digest and discussion, in Technologic Paper No. 61, just issued. The available data concerning the types and weights of foreign railway equipment, together with those concerning derailments and accidents abroad, are also included in the publication. Persons interested may obtain copies of the paper, which is entitled "Foreign Specifications for Railway Material," without charge upon application to the Bureau of Standards, Washington, D. C.

CAR LIGHTING.—Bulletin No. 154, issued under date of March, 1916, by the Electric Storage Battery Company, Philadelphia, Pa., describes in considerable detail the E. S. B. constant voltage axle lighting system. The bulletin in its 12 pages contains four parts: I, General Principles and Advantages; II, Method of Operation; III, Details of Construction, and IV, Performance Records. The fundamental principle of the E. S. B. axle system is constant voltage as distinguished from constant current. The operation of the system is fully explained in part II. The distinguishing feature is the use of the Rosenberg type of dynamo wherein the main field is produced by a magneto motive force developed by the armature winding. It is explained how, by the use of this type of dynamo, and by the use of the Wheatstone bridge method of field control, the pole changer and the lamp regulator are eliminated as are also the danger from overload and reversal of polarity. This part of the bulletin also explains why it is not necessary to have any levers, pivots, carbon piles, vibrating contacts or moving parts (except in the automatic switch) on the control panel.

Railway Construction

BOSTON SUBWAYS.—A contract has been given to the T. A. Gillespie Company, New York, for building Section J of the Dorchester tunnel. This company offered to do the work for $346,887. Section J is about 1,000 ft. long, and is located in Dorchester avenue and Boston street. The Andrew Square station is included in the contract. The subway will be of steel and concrete construction.

LENOX SAWMILL COMPANY'S ROAD.—This company is building a line from Redwine, Ky., on the Morehead & North Fork, to its mills at Lenox, six miles. Only 400 ft. of a tunnel remains to be completed, for which contract may be let, and the tracklaying, which will be carried out by company forces. The line will be operated as a private road. W. S. Whitney, president, Elizabethtown, Tenn.; M. E. Miller, secretary, Morehead, Ky.

MISSISSIPPI ROADS.—A standard gage railroad is being built by McKinnon Brothers, lumbermen of Pachuta, Miss., it is said, from their mills to connect with the New Orleans & Northeastern at Beatrice, Miss. The line will be about 15 miles long.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Surveys are being made for building a 13-mile branch line, it is said, from a point near Doyle, Tenn., south via Spencer in Van Buren county, through lands of the Dry Fork Coal & Timber Corporation of Charleston, S. C.

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has adopted the plans and forms of contracts for the construction of sections Nos. 1, 4 and 5 of the Fourteenth street-Eastern rapid transit line to be operated by the New York Municipal Railway Corporation. Bids will be opened on May 18 for Section No. 1, May 16 for Section No. 4 and May 22 for Section No. 5. Section No. 1 covers that portion of the line extending under Fourteenth street from Sixth avenue to Irving Place in the borough of Manhattan, and Sections Nos. 4 and 5 are in the borough of Brooklyn, extending from North Seventh street and Bedford avenue to Bushwick avenue and Meserole street.

NORFOLK & WESTERN.—Bids are wanted by this company on April 26, for the construction of 3 miles of double track between Joe, W. Va. and Alnwick. This work will consist of approximately 131,000 cu. yd. of excavation, of which 71,000 cu. yd. is borrow; also from 800 to 1,200 yd. of class "A" masonry.

PITTSBURGH & LAKE ERIE.—This company is carrying out double tracking work on about two miles between Fayette City, Pa., and Newell.

QUEBEC, MONTREAL & SOUTHERN.—An officer writes that work will not be carried out for some time on the extension of this road from Noyan Junction, Que., to the International boundary. The Dominion Government has granted an extension of time in which to build this section.

SAN ANTONIO, GONZALES & HOUSTON INTERURBAN.—C. C. Godman, of Kansas City, Mo., has been elected president, it is said, of this company, which has been organized to build an electric line between Houston, Tex., and San Antonio, with a north and south branch line connecting Victoria and Austin, in all about 300 miles. The permanent survey for the main line is nearly finished, and most of the right of way has been secured. Construction work will be started at Gonzales, it is said, on May 10. Liberal cash and land bonuses have been raised in aid of the project by many of the towns and communities along the route.

SAN ANTONIO & NORTHWESTERN.—A charter has been given to this company in Texas with $125,000 capital. The plans call for building a line from San Antonio, Tex., west to Rocksprings, 125 miles, traversing the counties of Bexar, Medina, Bandera, Real and Edwards. Dr. A. A. Luther, president; W. L. Williams, first vice-president and general manager; W. W. Williams, second vice-president; W. S. Luther, secretary. March 17, p. 527. The principal office of the company is at San Antonio.

TIDEWATER SECURITIES CORPORATION.—An extension is now

under construction from Alabama Port, Ala., to Dauphin Island. This section is expected to be finished about July 1. (November 26, 1915, p. 1032.)

WABASH.—This railroad and the city of St. Louis, Mo., have not yet come to an agreement as to the method of eliminating grade crossings between Forest Park and the city limits. The city favors the depression of tracks, whereas the Wabash has prepared plans for raising tracks above the streets. It is said in favor of the latter scheme that the depression of tracks would place them below the level of the Des Peres river.

RAILWAY STRUCTURES

BRANTFORD, ONT.—A contract has been given to Schultz Brothers & Co., Ltd., Brantford, for building a brick station on Colborne street, Brantford. The building will be 36 ft. wide and 76 ft. long, and is to be used jointly by the Lake Erie & Northern, and the Hamilton & Brantford Electric Railway.

BUENA VISTA, FLA.—Regarding the construction of division terminal facilities, etc., at Buenta Vista, for the Florida East Coast, an officer writes that this proposed construction is to be carried out to remove the present facilities from the center of the city of Miami to another location providing ample room for the company's purposes. Forces are now at work on the clearing, grubbing and grading of the grounds, which embrace, approximately, 48 acres. The work calls for improvements as follows: Five miles of track for the mechanical department; six and one-half miles of track for the transportation department; one 85-ft. through turntable; a ten-stall roundhouse; a small machine shop, with other necessary division terminal shop buildings; the buildings will cost about $32,000. The moving and installing of the machinery, with individual motor-drives for each machine, will cost about $5,500, and the total cost of all the work, including buildings, is estimated to be about $200,000. It is expected that the work will be completed during 1916. All of the work will be carried out by company forces under the general direction of C. S. Coe, engineer maintenance of way.

CHATTANOOGA, TENN.—A contract has been let to the American Bridge Company for one span, the draw span (a vertical lift bridge), of the proposed new double track bridge of the Cincinnati, New Orleans & Texas Pacific over the Tennessee river, about six miles north of Chattanooga. This span will replace the temporary structure, which was installed at the time span No. 2 collapsed on account of being struck by shifted load on a flat car on March 17 last. The present structure is a single track bridge, which will be replaced in the future by a new double track bridge, but for the present arrangements have been made to install only one of the spans of the new double track bridge. The double track bridge when completed will consist of 1 vertical lift span of about 310 ft., 1 fixed span about 230 ft. long, and 6 fixed spans of about 210 ft. each. The masonry required will amount to about 67,000 cu. yd. of reinforced concrete.

DAVENPORT, IOWA.—The Chicago, Milwaukee & St. Paul, the Chicago, Burlington & Quincy, and the Davenport, Rock Island & Northwestern have jointly agreed to make extensive improvements here. The program includes the construction of a union passenger station, a new freight house and yards, the depression of main line tracks and the removal of switch tracks from the river front. Work on the freight house and yards will be begun on about July 1, with the prospect of their completion this year. The union depot will be built in 1917, and the subway the following year. The total cost of these improvements has been estimated at $500,000.

DURANT, OKLA.—A contract has been given to H. E. McCart, Durant, for building a passenger station at Durant, to be 122 ft. by 79 ft., of brick construction with stone trimmings. This station will be used jointly by the St. Louis & San Francisco and the Missouri, Kansas & Texas. The estimated cost is $30,000, and the work will be completed in May.

FLORENCE, S. C.—A contract has been let by the Seaboard Air Line to the Christian Construction Company, Durham, N. C., for the construction of a new passenger station at Florence. The structure will be one story high, 30½ ft. wide by 80 ft. long, of brick and wood construction, and will cost about $8,600.

GREAT NORTHERN.—This company has awarded contracts for the construction of snow sheds in the Cascade mountains as follows: timber snow sheds, east slope, to the W. J. Hoy Company, St. Paul, Minn.; timber snow sheds, west slope, to Grant Smith & Co.; concrete sheds, west slope, Henry & McFee, Seattle.

KANSAS CITY, KAN.—The erection of a double track viaduct over the Kaw river bottoms, including a bridge over the Kaw river, proposed by the Kansas City Terminal, is delayed pending the passage of an ordinance by the city council of Kansas City, Kan., authorizing the work. This structure will require about 17,000 tons of bridge steel.

KENOSHA, WIS.—The Railroad Commission of Wisconsin has ordered the Chicago & Northwestern to elevate its tracks in this city. It is estimated that the work will cost about $1,600,000.

MONTROSE, ONT.—The Michigan Central has awarded a contract to the Wallbridge-Aldinger Company of Detroit, Mich., for the construction of a 97-ft. roundhouse, an oil house, a small machine shop, and a coal chute here. The buildings will be of concrete and brick construction, and work will begin on them about May 1.

NEWARK, N. J.—Bids will be asked for about June 1 by the chief engineer of the Central of New Jersey for putting up a new terminal station on Broad street in Newark. The proposed station is to be 67 ft. high, 300 ft. wide, and there will be a concourse 166 ft. long; the station and platforms will be 1,040 ft. long. It will be of steel frame construction, with brick and terra cotta walls on concrete foundations. (April 14, p. 865.)

PHILADELPHIA, PA.—The Turner Concrete Company submitted the lowest bid at $304,000 for the construction of a freight house at the Federal street freight yards of the Pennsylvania Railroad The structure will be 4 stories high, 60 ft. wide by 468 ft. long and will be of reinforced concrete and brick construction.

A contract has been given by the Pennsylvania Railroad to T. F. Foley, Philadelphia, Pa., for the separation of grades at Chelten Avenue. The estimated cost of this work is $200,000. A contract has also been let to John Goll & Co., Philadelphia, for the construction of an under grade crossing at Hortter street, at an estimated cost of $40,000, an bids are now being asked for the separation of grades at Highland Station. All this work is on the Chestnut Hill branch and will be completed this year, preliminary to the electrification of the line. These improvements will remove all the remaining grade crossings, and the cost of the work is being paid for equally by the city and the railroad company.

READING, PA.—The Philadelphia & Reading has awarded contracts for improvements to the bridge over the Schuylkill river at a point south of Reading. The superstructure is to be of steel, and will consist of one 30-ft. span and one 40-ft. span. The contract for the foundation work, which includes a new concrete pier, and changes and additions to the existing masonry, has been given to the Charles McDermott Company, Philadelphia. The contract for fabricating and erecting the superstructure has been given to the Pennsylvania Steel Company of Delaware, Steelton, Pa.

SIOUX CITY, IOWA.—The Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha have jointly appropriated about $130,000 for improvements to their shops here. The work will include the installation of four 300 hp. boilers, a boiler washing plant for a 38-stall engine house, and the construction of a cinder pit and approach. Part of the above appropriation will be used for the purchase of new tools.

TRENTON, N. J.—The Pennsylvania Railroad is about to ask for bids for work involved in the elimination of grades at East Clinton avenue and Whitehead road in Trenton. This work was ordered done by the public utilities commission and the cost is ordered divided between the railroad company and the public. (March 24, p. 704.)

WEST BURLINGTON, IOWA.—The Chicago, Burlington & Quincy will make extensive additions to its shops at this point during the coming year. Plans of the new buildings have not yet been completed.

WORCESTER, MASS.—The Boston & Albany will ask for bids soon for building a new freight house at Worcester which will be used exclusively for out-bound freight. It will be 450 ft. long and 30 ft. wide.

Railway Financial News

ANN ARBOR.—The Ohio Public Utilities Commission has approved of the financing by the Ann Arbor of a boat company to purchase a new car ferry at a cost of $422,000 through the issue of a note for $12,000 by the Ann Arbor, a guarantee of the boat company's notes of $85,000 and of the boat company's first mortgage bonds of $325,000, and the deposit as security for the notes of $120,000 Ann Arbor improvement and extension mortgage bonds.

CATSKILL MOUNTAIN.—The Catskill Mountain Railway was sold on April 26 to E. E. Olcott, president of the Hudson River Day Line (Steamers), and allied interests. The road is 16 miles long, from Catskill, N. Y., on the Hudson river, to Palenville, and it leases the Cairo Railroad, 4 miles long. Its business is principally summer resort passenger traffic. By this purchase the Hudson River Day Line obtains control of the entire Catskill Mountain Railway System.

CHESAPEAKE & OHIO.—Stockholders have voted to approve of the issue of $40,180,000 5 per cent convertible bonds, the proceeds of which are to be used to retire $33,000,000 five-year notes and to provide between five and six million dollars additional working capital.

INTERNATIONAL & GREAT NORTHERN.—Judge W. T. Burns, in the United States district court, has authorized the receiver of the International & Great Northern to issue $1,400,000 6 per cent one-year receiver's certificates. The proceeds of the sale of these certificates is to be used to pay $700,000 receiver's certificates due on May 1, and to pay for improvements costing approximately $700,000. Of the amount to be spent for improvements a press despatch says that $200,000 will be spent for shops at San Antonio, $155,000 for passenger equipment and $345,000 for ballast.

LONG ISLAND.—John F. Stevens testified as an expert witness for the complainant in the suit which has been brought by Dick Brothers & Co., a New York and Boston stock brokerage house, against the officers and directors of the Long Island for an accounting. He is reported to have said: "The electrification of the Long Island road beyond Atlantic avenue, Brooklyn, was an unnecessary expense at the rate of $70,000 a mile, or $5,558,000. The cost—$9,883,408—of the Bay Ridge cutoff for freight was unnecessary. There was little or no freight in that section warranting such an outlay. There was also an expense of $875,770 for the Sunnyside and North Shore yards, and the Montauk cutoff, which might be regarded as unnecessary as far as the Long Island Railroad was concerned." Under cross examination Mr. Stevens admitted that these yards might be of benefit to the entire system when the New York Connecting Railroad was completed.

"As I was a director of both roads you may rest assured that whenever I attended a meeting of the directors of the Long Island Company I voted and acted for the best interest of all the stockholders and not for any particular group of stockholders. For many years before the successful eletrification of railroads within commuting distance of the large cities the Pennsylvania Railroad sought an entrance into the heart of New York City, realizing that to compete with the New York Central some such terminal within the city was absolutely necessary.

"The Pennsylvania first wanted to come across the much talked of Hudson river bridge, which before the electrification of roads was an assured success. As soon as practicable the idea of tube connections into New York was carried out. These tube connections will eventually be just as profitable to the Long Island as they are proportionately to the Pennsylvania Railroad.

"The mistake the minority stockholders make is in supposing that a road can remain stationary. The directors in spending the $28,000,000 which the minority shareholders think is insufficiently remunerative were planning at least 50 years ahead—as all good railroad directors ought to do. It was only a question of time when the improvements would have had to be made or the Long Island would have been relegated to the scrap heap."

NEW YORK CENTRAL.—Justice Morschauser, in the New York Supreme Court, has dismissed the suit of Clarence Venner seeking to disrupt the consolidation of the New York Central & Hudson River and the Lake Shore & Michigan Southern. The justice says that, generally speaking, the railroads controlled by the New York Central serve territory quite distinct from that served by the railroad of the consolidated company. The following is an abstract from one part of the decision:

"The plaintiff invokes the federal statute known as the Sherman act and claims the right, under that statute and the subsequently enacted Clayton act, to compel, by the injunctive powers of the court, what would be substantially a dissolution and disintegration of the extensive system of railroads comprising the New York Central lines. The plaintiff has proved no damage to himself as a stockholder, or to the companies in which he is a stockholder, resulting from the present control through lease or stock ownership of the various railroads now parts of the system. A recent decision by the Federal Court has denied the right of a minority stockholder, thus failing to prove special damage, to secure any relief under the Sherman act."

NEW YORK, CHICAGO & ST. LOUIS.—The Public Utilities Commission of Ohio has authorized the New York, Chicago & St. Louis to issue $1,250,000 equipment trust certificates to pay for 90 per cent of the purchase price of 1,000 steel underframe 40-ton box cars.

NORFOLK & WESTERN.—The directors have declared a quarterly dividend of 1¾ per cent on the common stock, making the annual rate of 7 per cent, as compared with the 6 per cent annual rate which has been paid since 1911.

ST. LOUIS, BROWNSVILLE & MEXICO.—The formal order transferring the St. Louis, Brownsville & Mexico, the Beaumont, Sour Lake & Western, and the Orange & Northwestern, from the receiver to the new company which takes over these properties—the New Orleans, Texas & Mexico—has been entered.

SCOTTISH RAILWAYS TO RAISE RATES.—The Scottish railway companies recently gave public notice that from March 20 the rate from Caledonian and North British stations to other stations in Scotland would, where they are not already at the maximum, be raised to the maximum, less 10 per cent.

EXPORTS OF RAILS FROM ENGLAND.—The exports of rails from the United Kingdom in February showed considerable weakness, having declined to 3,905 tons, as compared with 14,877 tons in February, 1915, and 35,484 tons in February, 1914. There were no shipments of rails to the Argentine Republic in February. The colonial demand for rails in the first two months of the last three years was represented by the following figures:

	Tons		
Colonial Group.	1916.	1915.	1914.
South Africa	131	3,956	20,623
British India	4,169	14,563	15,149
Australia	317	13,372	35,604
Canada	Nil	2	1

RAILWAY DEVELOPMENT IN MOSCOW DISTRICT.—The Acting British Consul-General at Moscow reports as follows on railway development in the Moscow district: Between Vladimir and Moscow on the Nijni line there is a large and important manufacturing district, of which Oriechovo-Zuevo is the chief center. The factories in this district receive their cotton and much of their food supplies from the south, the goods in question coming by the Kazan line. Owing to the 10 versts (about 6½ miles) between Ilinski Pogost and Egorievsk, which would unite the Kazan and Nijni lines, not having been linked up by rail, the cotton for the Oriechovo-Zuevo manufacturing district has hitherto been compelled to travel up the Kazan line all the way to Moscow and then back by the Nijni line to Oriechovo-Zuevo. The connecting line between the Kazan and Nijni railways having recently been completed by linking up Ilinski Pogost and Egorievsk, and opened for traffic, it is estimated that the manufacturers of the latter town will be saved many thousand roubles yearly in freight charges. A similar project has been formed to connect the Yaroslav and Nijni lines.—*Railway Gazette, London.*